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LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLXIV. No. 3153.] LONDON, OCTOBER 17, 1923. [75TH YEAR. PRICE 1s.

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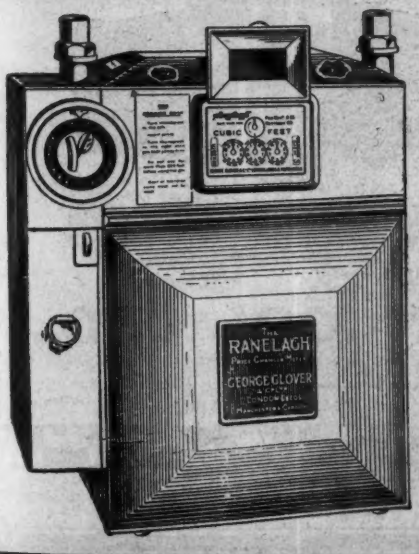

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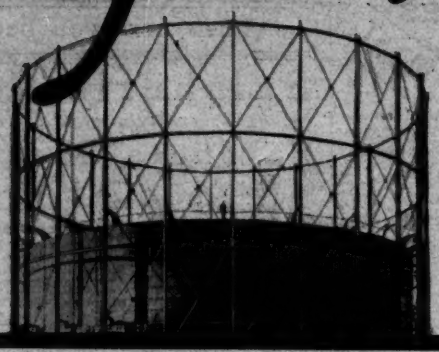

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VOL. CLXIV., No. 3153.] WEDNESDAY, OCTOBER 17, 1923. [75TH YEAR.

EDITORIAL NOTES.

Our Industrial Civilization.

HAS the civilization of the gas industry made real and adequate advance? This may seem a strange question to those who look upon "civilization" as being only a removal and progress from the barbaric states of people. But, of course, the word has a broader meaning. It embraces culture and refinement, improved methods of doing things, the advance of ourselves, our interests, and our work with the times, and their requirements. So regarded, we repeat the question, "Has the civilization of the gas industry made real and adequate advance?" An answer as to real advance can only be given by comparison with the past, and whether we have advanced far enough can only be tested by reflection upon current conditions and needs. Comparison with (say) five-and-twenty years ago shows that we have made tremendous progress in our industrial civilization; reflection upon current conditions and needs declares that there is yet much more that can be done, and must be done, to place the industry in a perfectly satisfactory position. It is no derogation of ourselves to-day to admit this; it simply demonstrates the capacity and the strength to recognize plain facts. One of the matters for the liveliest satisfaction is that there are well-defined evidences of strong efforts being made to remedy the omissions of the past; and there are material proofs that what is being done is being directed by experience and clear perception.

We have been reading during the past week of independence in the individual being a right and proper thing; in other words, every man should own himself. That is true. But self-ownership is a doctrine that must not become an obsession, and must not be carried beyond logical limits. Association is also an excellent thing. The individual benefits by it. A knowledge of the thoughts, views, actions, and doings of other people assists in enlarging one's own compass in mental and other activity; and yet this need not interfere with independence. It is in truth an important aid to it. In the progress of the gas industry—in magnitude, in economy, in activity, in service, in new methods of doing things—association of men and undertakings has had an important place and part. The accomplishments would never have been of the existing order had there been a continuation of the unit state, instead of a development of the state of unity. Our associations have done much to promote the industry's civilization — its culture, its refinements in methods, and its constructive capacity; and to all the industry's associations, and to the men who have been and are now their mainsprings, there is much indebtedness. That is one important phase in the industry's progress. Attention is directed to it in the Presidential Address of Mr. W. Clark Jackson, of Neath, to the Wales and Monmouthshire Institution of Gas Engineers and Managers. As a matter of fact, the contents of that address are responsible for the question, "Has the civilization of the gas industry made real and adequate advance?" And the same deliverance enables an answer to be given in the affirmative as to real progress having been made. The President acknowledges the great value that our institutions have been to us, directed by gifted leaders, particularly during the years of difficulty that day by day threatened to overwhelm. The National Gas Council, the Federation of Gas Employers, the British Commercial Gas Association, and other organizations, all represent advances in the industry. Surrounding conditions have changed. New methods are required of doing things that will both promote and defend interests; and these institutions in their different spheres are filling the requirements—politically, technically, and commercially—with a spirit and good statesmanship that claim and obtain the admiration of men in most places, and by no means least in Wales and Monmouthshire. They have also brought into active association men of different positions in the gas industry—administrators, managers, and technical and commercial men—and in this way the power and influence of the industry have been increased in a manner beyond description. That is a great advance, and a necessary one, upon the more or less crude individual way in which things were previously done, and which defied any system being brought to bear upon the industry's affairs other than that which was imposed (without representative discussion from the side of the industry) by legislative ordinance.

Certain of the organizations already referred to are the sources of much inspiration for beneficial operations; and they secure the necessary facilities for prosecuting work which makes for general economy and progress in various directions. The Institution of Gas Engineers, being left at liberty to confine itself to its own proper functions, has considerably developed its technical work to the advantage —present and future—of the entire industry. Its researches, in conjunction with the University of Leeds, into gas processes and methods are invaluable, and its recent task in scheming for the systematic and higher education of the young men qualifying for technical office in the industry proves an omission of the past, and shows one direction in which adequate progress has not been made in our industrial civilization. But, on the other hand, we have been fortunate in a partial filling of the omission by the juniors themselves, who evinced a strong individuality and inclination to personal and mutual improvement by following the lead of their seniors, and banding themselves together in their respective areas for technical intercourse. Some of these junior organizations have been long enough in existence for many of the members to have become seniors; and the value that these organizations were to them in shaping their official technical careers and their part and place in the senior organizations is one of the distinctive features of our modern industrial history. That is another advance in our industrial civilization; so is the "B.C.G.A.," and so are the methods that are now applied to that fundamental work of developing the industry through gas sales.

But here we have more omissions in the work of advancing our industrial civilization than in any other part of the industry. Mr. Jackson, in his address, refers to the Salesmen's Circles, which are quite an innovation. They are a partial rectification of one of the omissions of the past. They are an educative force among the salesmen of the gas industry; and now a scheme is in process of formulation for the higher education—technically and commercially and in salesmanship generally—of the men whose business it is to cultivate sales, and to render service to the public on behalf of the industry. Those men are highly important to the industry; they can do much to make or mar. The education scheme for them is another step in our progress in industrial civilization. We pass on to the gas consumers. There is another omission in the industry's advance—not a general one, but unfortunately it might almost be described as such. It is not an omission at Neath. Mr. Jackson shows in his address how largely we have advanced in our production economies. More product is realized from every ton of coal, and a higher duty is

obtained from every man. This means greater plant and man efficiency; and at Neath every man is individually instructed in his functions, so that he and the plant may have the best possible opportunity of performance. Throughout the gas industry, these economies in manufacture are developing through the higher efficiency plants and processes, and the progressively better training of the men. Through the Gas Regulation Act we have more system in respect of quality and pressure; and these are important aids to good public service. More is known to-day as to distribution. So the industry has made good progress in its civilization up to the meter; and the appliances, by which gas is used beyond the meter, have advanced in both their thermal and domestic or industrial efficiency—if rightly used. But here advance has been inadequate. In many gas-supply areas, the policy of gas undertakings beyond the meter is crude—may we not say without offence, almost uncivilized. They leave the consumers to do the best they can with the appliances—consumers without knowledge as to the importance of small details to working efficiency and economy. Through this, there is, at the most vital part of the industry's system, the greatest weakness in many gas-supply areas. There will not be adequate advance in our industrial civilization in this direction until there is proper service in the home, factory, shop, and elsewhere on the part of all undertakings, with the view to maintain efficiency in use. This is done in many places; and only those who have introduced the system of free inspection, maintenance, and regulation know of its value from the standpoints of competition, protection, and development. The system of free service to the consumer has been in operation at Neath for several years; and the experience is interesting. The work is carried out by specially trained young women; each consumer being visited at approximately half-quarterly intervals. Says Mr. Jackson: "It is wonderful the amount of business that these young "women bring into the undertaking, particularly after they "have gained the confidence of the consumer, and when the "latter begins to appreciate that the gas undertaking is out "for service all the time. After deducting the profit on "sales actually made by these young women, the cost of "maintaining this service at Neath is under a farthing per "1000 c.ft."

The examination of existing conditions answers our question. Giving to the term its fullest meaning, our "industrial civilization" has made enormous advances, but there are some parts of the ground on which the progress has not been *pari passu* with that on other parts. But rectification of this condition is not beyond the power of the industry. It is pushing forward its plans for generally raising the level of official and man efficiency, and for bringing about a larger measure of scientific control over processes with a view to achieving further economies. But there is still much work to be done in altering the policy which allows crude use the other side of the consumer's door. Let us complete our industrial civilization by doing what is wanted and is essential there, on lines which have been proved efficacious by those who have carried the policy of service to the points of gas use.

Unemployment Grants to Public Utility Concerns.

In connection with the unemployment relief plans of the Government, the terms have now been published on which assistance will be granted to public utility companies for carrying-out approved works. There are two or three points which should be remembered in considering these terms. The first is that it is only right the Government, in granting financial assistance, should first satisfy themselves that the works proposed to be executed are of a nature that will serve the objects they have in view, and will be carried-out, or will provide work, during the winter. Associated with this is the consideration that it does not necessarily follow that the work will be for the relief of unemployment only in the district for which the finished work is destined. The Government desire as large a distribution of relief as possible in, for instance, those industries in which there are skilled artizans without work. Such schemes as will require the provision of materials or plant will receive particularly favourable attention. The third point is that the terms are in more or less general form with the view of application to the dissimilar conditions of gas, water, electricity, tramways, docks, harbours, and canals.

It will be found that the terms (which are quoted in our "Miscellaneous News" columns to-day) have been framed in a manner which will give the Committee a large amount of discretion; and therefore any special conditions applying to any one class of public utility concern can be dealt with by them. The Committee, it will be observed, retain the right to satisfy themselves as to the reasonableness of the tender accepted for the works; and, naturally, the material employed must be of British manufacture. The approval of the Committee, too, will be required to the terms on which the capital is raised. It will be remembered that one point which the National Gas Council discussed with the Committee was as to the limitation of profits in the case of gas companies whose dividends are already regulated by statute; and, as a result of the discussion, the Committee announced that, where dividends are so limited, "further provision as to limitations does not apply." Although this is not stated in the terms as published, it will be seen that the applicable condition supplies the Committee with abundant latitude for giving effect to their undertaking in respect of public utility concerns whose dividends are already statutorily controlled. The words we have italicized show this: "The undertaking will *normally* be required to submit to "such limitations as to the distribution of profits, &c., during "the period of assistance as may be necessary to secure, in "the opinion of the Committee, that no undue advantage is "taken of such assistance. *Each case in this respect will be* "*considered separately upon its own merits.*"

In connection with local authorities, the Committee offered alternative grants—50 p.ct. of the interest on loans raised to carry-out the work, or alternatively 60 p.ct. of the wages bill of unemployed men taken on in connection with the scheme. The terms for public utility companies, as published, do not mention the alternative. It is simply stated that assistance will be limited to 50 p.ct. of the interest on the expenditure incurred, out of capital raised, and will normally be given only for the period during which the expenditure is not reasonably remunerative. Of course, in the case of gas undertakings, it is not always necessary to raise new capital for works which would give employment—some being reconstruction and so chargeable to revenue; others, partly extension and partly reconstruction, and so chargeable in part to capital and in part to revenue. What would happen in such cases? The National Gas Council raised these two points with the Committee; and proposals were made (which the latter agreed to recommend to the Government) to the effect that the conditions should include the alternative as to the payment of 60 p.ct. of the wages bill of unemployed men engaged in connection with an approved scheme, and (or) payment of half the interest upon the capital value of the work for a certain period of years. The terms published in this issue only reached us last week; and it was in September that these matters were under discussion between the Council and the Committee. It does not appear, therefore, that any decision has yet been reached in respect of the proposals mentioned above. At any rate, as soon as the Council learn the fate of the suggestions, they will notify the undertakings which received their previous circular-letter regarding them.

Gas Developments in Industry and Trade.

The large development of the business of the gas industry has brought with it new responsibilities. This is bound to be the case. We want the business; we must therefore work for it, and, when obtained, we must keep it by the application of effective methods. The new responsibilities are manifold. When business is opened-up in new lines, there must be a good understanding of the work to be performed and of its requirements; and it must be an obligation to see that the appliances best suited to the purposes are obtained, and that they are subsequently kept up to first-rate efficiency. It is only by comprehensive and systematic methods that the business will be retained, and achievement be a recommendation to extension. As we read the papers treating of the industrial applications of gas that were presented at the annual meeting of the "B.C.G.A." (as noticed last week) by Mr. A. W. Smith, the General Manager and Secretary of the Birmingham Corporation Gas Department, and by Dr. C. M. Walter, the Engineer-in-Charge of the Department's Industrial Research Laboratories, we were, as others must have been, struck by the highly organized and systematic methods which have been applied to the industrial part of the gas business in Birmingham, which part represents no less than 30 p.ct. of the gas output, with good promise that, though the volume of the other business

will still expand, the percentage ratio of the industrial to the other combined classes of business will become still more impressive.

The methods for the development and maintenance of the industrial gas business in the city have been conceived with unsurpassed thoroughness, and have been brought to a state of high efficiency; and one of the chief factors in success has been the institution of the industrial research laboratories, with (for a long period now) Dr. Walter in charge. Among the many striking points in Mr. Smith's paper was one which strongly appealed to us in this matter of industrial gas-development work. It was that Dr. Walter has won the confidence of the manufacturers with whom he has been brought in contact. This fact has a bearing the importance of which cannot be over-rated. The confidence of the manufacturers having been gained makes business relations, particularly consultations and investigations, so much easier than would otherwise be the case. While scientific and technical competence stands in the forefront, the ability to win the confidence of all in such work as is undertaken in the industrial research laboratories is an asset of much worth. What is the result? Much private investigation has been entrusted to the laboratories by manufacturers, to the mutual benefit of themselves and the Gas Department; and—what is also of good account—this experience operates to the development and the competence of those in charge of the laboratories. The result is that, to both the manufacturer and the Gas Department, the value of the laboratories and the staff is constantly increasing. As Mr. Smith puts it, the advantages are general and definite. The department is in many ways able to advise, to assist in overcoming difficulties, to suggest new methods, and to cheapen the costs of production—as witness the modified counter-current regenerator furnace, which has been developed, and which, though entirely on the natural draught system, is capable of realizing, if required, considerably over 1100° C. The possibilities of this furnace (which Dr. Walter explained) are very considerable, especially where the heating process is a continuous one. It is part of the work of the laboratories to design heating appliances for industrial work where standard types are not suitable, or where greater efficiency can be secured. Of course, Birmingham is in an exceptional position in regard to opportunities in this connection, with its mass of industries engaged in a hundred different trades, apart from the variation of processes.

Of course, there are comparatively few gas undertakings that could keep industrial research laboratories going on the scale of those in Birmingham, and on the same lines of thoroughness and perfection. But the gas industry has found the Gas Department very generous with information and help; and Mr. Smith made it clear that they are always pleased to do this so far as they are able without breaking confidences. But of course, there must be a limit to this free information and assistance, as it means a trespass on time, and in some measure an unproductive expense to the Gas Department. This raises the consideration whether research laboratories of the kind possessed by one large undertaking could not develop a scheme whereby services could be placed at the disposal of smaller undertakings, by the payment of a reasonable fee and the expenses incurred in the work undertaken. With the accrued experience at such laboratories, there would be great value obtained by inquirers for a comparatively small expenditure. The point is worth thinking about, and would be of widespread value if its development were possible. We see no reason why it should not be. At the Birmingham laboratories, more difficult problems than this have been solved.

Another point is that in these industrial papers and in their discussion, there was recognition—particularly by Mr. Smith and Mr. Ralph Halkett—of the importance in the industrial power and heat business of making periodical inspection and adjustments of engines, furnaces, and other heating appliances. In Birmingham, the Gas Department have a fitter who has had a course of training in a gas-engine manufacturers' works. His duty is to make a periodical inspection of small gas-engines in the city; and for a nominal charge, he indicates them, and keeps them in an efficient condition. We can well understand that the manufacturers greatly appreciate this. To have their engines kept "tuned up" means economy; and it has often prevented engines being turned out, and new tenants installed in the form of electric motors. The competitors of the gas industry are not altogether pleased to see this practice of scientific methods in the management and promotion of the gas business. The more it is pursued, the more difficult they find their path in bringing about the supersession of gas by their own commodity. The gas industry is doing no wrong in thus creating greater difficulties for the competitors—on the contrary, it is protecting its own interests, and producing economies for the users of gas-engines. Nor do the competitors like to hear or read such hard facts as those presented by Mr. George S. Eunson, which are capable of verification in daily practice. His paper dealt with the use of gas in the boot and shoe industry in Northampton. There are at work in the town 230 gas-engines, which are all giving entire satisfaction, on account of both their economy and working efficiency, which the Gas Company do their part in maintaining. At a charge of 6·08d. per therm net, and an efficiency of 9600 B.Th.U. per H.P.-hour, the cost of gas only works out to 0·58d. per H.P.-hour. At this figure there is no doubt gas is the cheapest form of power. As Mr. Eunson points out, if a manufacturer prefers electric motors instead of shafting, he can have a dynamo, and produce current at a price—including capital charges, working expenses, interest, and depreciation—of 1½d. per unit; and this can be used for both lighting and power. Electricity undertakings cannot afford to supply at anything like a flat rate of that order. Very much more attention is being paid to-day than formerly to this private generation of electric current for factories and other large business establishments; and it is an excellent line of competitive business for gas undertakings, which is bound to be lucrative, if to it proper attention is paid. Another line of development is the provision of steam for factories. Mr. Eunson has had experience of the Spencer-Bonecourt boiler in a polish-making factory. Steam is economically produced; and he sees a big field in trade for this method of steam-raising.

The important subject of the use of gas in catering was dealt with in the four succeeding papers. Mr. R. G. Marsh, of Birmingham, described important installations for cooking in canteens and other large establishments. Mr. W. B. M'Lusky told of what has been done in the provision of gas-heating for sugar-boilers in sweet factories; and he supplemented this with information as to other uses in the confectionery trade. From Burton-on-Trent came, through Mr. W. Wilson, interesting particulars, with consumption and cost data, as to the application of gas to beer boilers, in which operating efficiencies of 50 to 54 p.ct. were shown. The use of gas for fish and potato frying formed the subject of a paper by Mr. Harry Clark, of Derby. With a fuel cost of $1\frac{5}{16}$d. per stone of fish and potatoes, this method ought to have popularity everywhere. In all these papers, economy, cleanliness, and convenience were shown to attend the use of gas; and this means increased works or shop efficiency. Of course, all gas-supply districts have not in them sweet factories or breweries. But many areas can boast of large establishments in which gas-furnished canteens can be provided; and fish and potato frying is a ubiquitous trade. The practical points that will be found in these papers will be serviceable throughout the country.

Savings in Efficiently Winning and Treating Coal.

As ardent as ever is Sir Arthur Duckham, K.C.B., for the institution of a body of Heat, Light, and Power Commissioners under the Board of Trade, whose functions it should be to co-ordinate these basic requirements of the country in such manner as would result in the maximum economy being derived from our fuel supplies and the efficient use of coal-using plants and appliances—thus making an immense contribution to our national prosperity. Sir Arthur recently contributed an article to the "Fuel Economy Review" of the Federation of British Industries, in which he again pleaded for the higher scientific development and utilization of the power resources of the nation. In respect of coal, there is no question that there is a very serious waste to-day from the pit to the divers applications by the user; and we go on year after year showing a fine impotence and inability to relieve the country from the appalling waste. There are losses which perhaps could be assessed and a money value applied; but with all who have studied the subject, there is knowledge of very great losses through inefficiency, which are in the aggregate unassessable, but which experience and personal knowledge tell us plainly must represent an enormous amount.

At the base of all the waste are the methods at the collieries. Sir Arthur speaks with positiveness of the getting

of coal as practised in this country being a very wasteful and inefficient business; and his advice, put into a nutshell, is that the whole coal industry should be overhauled. The colliery owners and managers may be disposed to question Sir Arthur's condemnation of their methods and organization, and advance some technical reasons against the reforms that he would introduce in order to effect economies. However, he believes that, by the industry being reorganized, coal could be mined at a lower cost. In getting coal at the lowest possible cost, the whole nation is concerned; but it is important, to the country, too, that the coal should be cleansed and sized as far as possible. Every user of industrial heat requiring solid fuel knows of the considerable inefficiency and labour costs that ash and dirt in coal impose upon industry, and for the matter of that, in a smaller way, upon the domestic user. Useless as the inert material is, it has all to be carried and paid for; it occupies space in furnaces, helps to form clinker, and reduces efficiency. It is, said Sir Arthur, not too much to say that 25 to 50 p.ct. better efficiency could be obtained if an ashless fuel were available for general use. This indicates some of the reforms he would like to see brought about. He suggests, too, that scientific methods should be applied to the treatment of duff, dirty coal, &c., to make it available for efficient use in the collieries, or for industrial and domestic purposes. He would also prefer that all coal should be treated before use to recover the valuable bye-products.

As to the setting-up of Heat, Light, and Power Commissioners under the Board of Trade, it is not clear from the article whether the author considers that this body should have legislative or regulating powers. But unless something of the kind is the ultimate object, then their existence would only have a partial value in achieving the ends that Sir Arthur has in view in the preceding parts of his contribution. He proposed that they should encourage fuel investigations, and should co-operate with the Fuel Research Board, and the Committees of the Federation of British Industries, the Institution of Gas Engineers, the National Federation of Iron and Steel Manufacturers, &c. It is of considerable importance that as much data as possible should be collected on the combustion of fuels for varying purposes. With this object in view, it is suggested that the country might be divided into areas, and that the Universities in each area might collect and collate data for circulation to fuel users. The Universities might also supply the requisite technical staff to prepare data where the organization of any works is not suitable or available for the purpose. Control by Government departments is bad, says the reformer; but such bodies can certainly encourage and organize the efforts of others. Nothing is said as to whence the money for this work is to come. But if coal is to be cheapened, and the country is to realize a 25 to 50 p.ct. higher efficiency in the utilization of fuel, such prospects should be the means of providing, readily and willingly, the wherewithal to carry on the productive work.

A Standard Price Revision Inquiry.

The application to the Board of Trade of the London County Council for an amending Order under section 1 (3) of the Gas Regulation Act, in respect of the Gas Light and Coke Company, will be the subject of an inquiry to be opened on Wednesday, Nov. 14, at 11 a.m., at the Institution of Civil Engineers.

Wednesday, Nov. 28.

The minutes of the Council meeting of the Institution of Gas Engineers, as published last week, conveyed a wrong impression as to the date of the Institution's session of the Public Works, Roads, and Transport Congress. Readers are asked to note that the date should be Wednesday, Nov. 28.

Small Gas-Works and Chemical Regulations.

It is a very proper thing that nothing of an onerous nature should be placed on small gas undertakings which would prevent them developing their secondary products business in the most remunerative manner. This is a question in which the customers for gas of such concerns are seriously interested. It is a pleasure, therefore, to find that the Chief Inspector of Factories is inclined to be helpful to small gas undertakings in respect of the new regulations for chemical works. He has been looking into the matter; and, as a result, he recently told a deputation from the smaller gas-works that he feels a number of the regulations would not be applicable to them, and, where they are not so, certificates of exemption would not be required. Certain concessions were also obtained in respect of tar dehydration plants; and the Chief Inspector has under review various other suggested concessions also applying to such plants. The tar-dehydration plant is an important institution in some country areas, where a good outlet for tar is found for highway purposes.

Rating and Valuation Bill.

The National Gas Council did good work in bringing the Chief Inspector of Factories and the small gas undertakings into close contact on the subject of chemical works regulations. But the Council no sooner get clear of one subject than others crop up. There is now the new and far-reaching Rating and Valuation Bill, to which we called attention on Oct. 3 (p. 30). This measure will be of considerable importance to the gas industry, and will claim very close attention from the central organizations. The National Gas Council have appointed a small Committee to consider the proposals of the Bill in consultation with the Federation of British Industries and the British Water-Works Association.

Coal Propaganda.

The Coal Merchants' Federation of Great Britain are continuing to supply coal retailers with literature to distribute among householders—always naturally in favour of the use of coal, and always, and likewise naturally, against gas and electricity. One of the productions is the "£ *s. d.* of Heating;" the important omissions from which the general public, without knowledge of themal efficiencies, cannot detect. The leaflet states: "Economy is the need of the moment; the coal fire is the embodiment of economy." It is sought to prove that it is the "embodiment of economy." by telling the householder the respective costs of purchasing potential heat energy in coal, gas, and electricity; but nothing whatever is said as to the differences in the efficiencies of the three methods of heating, and the relative work entailed by them. This is the statement: "The amount of heat generated by coal to the value of 8d. would cost by gas 2s. 3d., and by electricity 8s." The consumer is not interested in the amount of heat generated; he is concerned in the amount of useful heat that he obtains in a room as the result of his expenditure. Eight pennyworth of coal, at 50s. per ton—the coal being of a value of 12,500 B.Th.U. per lb. —would develop on combustion 370,000 B.Th.U.; and at 20 p.ct. efficiency, the room would receive heat from that to the extent of 74,000 B.Th.U., or at 24 p.ct. efficiency 88,800 B.Th.U. A therm of gas costing 8d. would, at 75 p.ct. efficiency, impart to the room 75,000 B.Th.U. What about the coal merchants' comparison of 8d. for coal and 2s. 3d. for gas? Gas requires no purchasing by the householders in the same way as coal, no storage, no cartage from a coal-cellar to the various rooms, no cleaning-up of fire-places and laying of fires, and no attention to keep the fire alight. Rooms are not made dusty by gas; and the outer air is not polluted by smoke and other noxious effluvia—as is the case in the combustion of coal. An antidote to this literature of the coal merchants (which does not complete the tale) is found in an article in the "Daily Express," which shows that housewives may "make money" by economy; and the means of household economy referred to are gas-cookers and gas-fires, which save labour, and can be lighted and extinguished just when required. The coal merchants must be feeling a severe draught; but literature such as theirs will not stop the march of progress from crude conditions to a state of greater refinement.

Exhibitions and Awards.

During the past few months, the authorities of the British Empire Exhibition have been giving careful consideration to the question of awards, owing to the wish of some representative exhibitors that these should be made. One recognizes the many difficulties in the way of fairly and effectively assessing the merits of different exhibits. For example, on what basis should the juries be organized? Should the exhibits of one nation of the Empire be put into competition with the exhibits of another nation? What would be the practical tests applied in regard to various classes—such as machinery or agricultural products? All inquiries on these points have emphasized the extraordinary

difficulty of providing any satisfactory system of awards. Examination, too, of the records of past exhibitions, other than those of a limited sectional character, show that, usually and unavoidably, awards have been made in a very perfunctory manner. The general feeling seems to be that, having regard to the purely British character of the British Empire Exhibition, and the absence of any element of international competition, it would be in the best interests of the imperial objects of the Exhibition, as well as of the exhibitors themselves, to abandon awards on a competitive basis. An endeavour is now being made to secure the support of the Dominion and Colonial representatives and of the United Kingdom exhibitors for such a decision. If the general opinion is against awards being made, steps will be taken at once to regularize their abandonment. If this be found impossible, the awards in each particular section will probably be made by a jury appointed by the exhibitors in it. Should, however, the new policy be approved, a handsome commemorative medal will be presented to each exhibitor.

Railway Wages.

The men working on the railways of the country have had preferential consideration compared with the workers in other industries. The companies some time ago made proposals for a revision of the national wage agreement. The Associated Society of Locomotive Engineers and Firemen submitted to the Central Wages Board for the Railway Industry counter wages and conditions proposals for men working in the locomotive grades. If these had been conceded, they would not only have increased the wages of all locomotive men, but would have made further costly additions to the running of trains. For instance, the companies asked for the cancellation of the payment of rate-and-a-quarter for time worked between ten o'clock at night and four in the morning; while the counter proposals sought the extension of night hours from six to twelve, and the increase of the payment from rate-and-a-quarter to rate-and-a-half. In addition, it was requested that the wages of enginemen and motormen should be 20s. per day, firemen and assistant motormen 15s., and cleaners 10s. The proposals came before the Central Wages Board for the Railway Industry last Wednesday. The trade union representatives refused to agree to the proposals of the companies; and the representatives of the latter gave an equally emphatic refusal to the counter proposals from the workmen's side of the Board. The claims are next to be submitted to the National Wages Board, which is the final court of arbitration for the industry.

Combustion Products of Coke.

It is a pity that writers on technical subjects do not explain precisely what they mean. Had Prof. J. O. Arnold, F.R S., done this in an article he contributed to the "Fuel Economy Review" of the Federation of British Industries, he would have saved some subsequent correspondence. He wrote: "Coke contains in each 100 lbs., 90 of carbon, ½ of hydrogen, 1½ of nitrogen, 1½ of sulphur, 5¼ of ash. . . It should be remembered that the combustion of the smokeless fuels, coke and anthracite, pours into the air considerably greater volumes of the negative poisons, sulphuric acid and carbonic oxide gases, than those given off by an equal weight of coal. . . . Hence between coal and coke it is a question of balancing the disadvantages of coal which emits perhaps half of 1 p.ct. of its weight as visible smoke against the disadvantages of coke which emits (say) 25 p.ct. more sulphurous acid gas than coal." Mr. S. C. Colwell, the Secretary of the London Coke Committee, in a reply to these statements, pointed out that the immediate and most pressing aspect of the smoke problem is the elimination of the soot and tarry vapours which do so much harm. The emission of relatively minute quantities of other admittedly objectionable products is unavoidable if industry is to be carried on by the combustion of fuel whether solid, liquid, or gaseous. It cannot, however, be too often stated that the process of coke manufacture is carried on at a temperature of about 2000° Fahr., which has the effect of driving-off the volatile sulphur contained in the coal. The sulphur in the coke is, therefore, certainly not more, but probably less, than that in the coal. It is, moreover, in the fixed condition not easily volatilized, and is largely rejected in the ash and clinker, whereas the sulphur in raw coal is in about equal proportions, as fixed and volatile. Deprived of the visible carbon and tarry vapours, it is not surprising that, in the combustion products of coke, sulphurous gases are more in evidence than in those of coal; but it is far from fact that they are more noxious or deleterious. This is abundantly proved by the long duration of coke-fired boiler tubes as compared with those of boilers fired with (say) South Yorkshire coal slack or other coal high in sulphur content. Prof. Arnold, in a reply, stated that Mr. Colwell was discussing recovery plant coke, while he had in his mind steel melting coke from beehive ovens. The latter does contain more sulphur than recovery plant coke, because of the lower temperature at which it is carbonized. It is a pity it was not made clear in the original article that beehive coke was referred to; it would have saved many men besides Mr. Colwell misunderstanding Prof. Arnold.

PERSONAL.

Mr. E. L. Widdowson, M.I.Mech.E., known to the gas industry for many years in connection with carbonizing and constructional engineering, has recently become associated with Columbus Machinery, Limited, and is taking an active part in the management, with offices at 216, Abbey House, Westminster, S.W.1.

OBITUARY.

WILLIAM CHESHIRE.

We much regret to record the death, in his 64th year, of Mr. William Cheshire, which occurred at his home at King's Heath, Birmingham, after a long and trying illness.

Mr. Cheshire had been associated with the firm of W. Parkinson & Co. throughout his business career, which he commenced as draughtsman at Cottage Lane Works. He was concerned in the design and erection of station meters and governors in various parts of the country, and visited Australia and Canada on behalf of the firm. When W. Parkinson & Co. acquired the business of the late John Bent and Son, meter manufacturers, of Birmingham, Mr. Cheshire was appointed Manager. Under his energetic supervision the business rapidly developed, and the number of employees increased fourfold. When the firms of W. Parkinson & Co. and W. & B. Cowan amalgamated, Mr. Cheshire became one of the Managing Directors, and served in this capacity, as well as being a Director of the Parkinson Stove Company, up to the date of his retirement two years ago, which was necessitated by a breakdown in health.

On his retirement, Mr. Cheshire received substantial proofs of the esteem and regard not only of his co-Directors, but also of the staff, foremen, and workmen at Bell Barn Road. Accompanying a handsome testimonial was a letter in which the donors said—"You may indeed be proud that the business has developed so wonderfully under your guidance; but you may be prouder to know that you have won the esteem, respect, and affection of the hundreds who, in one capacity or another, have worked under you." This was indeed true of our friend, who, in spite of a strenuous business career, found time, in connection with social and religious work, to devote himself to the service of others.

He leaves a widow, two sons, and two daughters to mourn his loss, as well as a large circle of friends, by whom he will be sorely missed. To their sympathy with the family we sincerely add our own.

Friends will regret with us to learn of the death, on the 6th inst., of the wife of Mr. J. H. Cornish, Secretary, Manager, and Engineer of the Bridgwater Gas Company. During the "B.C.G.A." conference in Birmingham, Mr. Cornish was suddenly called away to the bedside of his wife, who had been in indifferent health for the past two years. In Bridgwater, where the family are greatly esteemed, much sympathy is felt for the husband, son, and daughter in their sad bereavement.

We regret to record the death last Wednesday, after a very short illness, of Dr. John Allen Harker, F.R.S., O.B.E., who was well known in connection with his war-time work on the organization of the labours of the Nitrogen Products Committee of the Ministry of Munitions, and as Director of the Research Laboratories instituted to study modern nitrogen-fixation processes. He was 53 years of age, and prior to the war was head of the Thermometry Division of the National Physical Laboratory at Teddington.

Manchester District Institution of Gas Engineers. — Friday, Oct. 26, is the date fixed for the next quarterly meeting of the Institution, which will take place at 2.15 in the Midland Hotel, Manchester, under the Presidency of Mr. R. E. Gibson, of Liverpool. After the transaction of formal business, Mr. W. Buckley's paper on "The Maintenance Costs of Vertical Retorts" (as published in the "Journal" of May 16 last) will be further discussed, and Mr. W. B. M'Lusky, of Halifax, will read a paper on "Gas for the House."

ELECTRICITY SUPPLY MEMORANDA.

There is quite a revival of interest in the question of the provision of private gas-driven electricity generating sets for factory owners who prefer electric motors to shafting, or whose operations make the electric drive more convenient.

The Private Generating Plant.

They can by private plants satisfy their electricity requirements for both power and lighting at a flat rate considerably below their average payment for lighting and power to the electricity supply undertakings. The same with cinema proprietors and large business establishments. Moreover, the users of private generating sets are not subject to so many of those potential seats of breakdown that exist at and between the generating station and their premises. This is a consideration to add to the important one of economy. We were recently [*ante*, p. 32] referring to this subject in connection with an article that Mr. W. A. Tookey contributed to the last issue of "The Gas Salesman," in which he gave some very useful data. At the "B.C.G.A." annual conference, Mr. George S. Eunson read a paper on the use of gas in the boot and shoe industry; and he sandwiched into the information some particulars as to what can be done at Northampton with gas-driven electricity generating sets. Of course, we take it that his very favourable figure is partly due to his having a fairly constant load. He sells the gas at 6·08d. per therm net; and, with a gas-engine having an efficiency of 9600 B.Th.U. per H.P.-hour, the cost of gas is 0·58d. Including capital charges, working expenses, and depreciation, current can be generated at 1½d. per unit; and the energy can be used freely for both lighting and power. This is a figure which rather puts the electricity undertaking out of competition; and the factory owners must find it very attractive—if enamoured of electricity. But the fact is that in Northampton there are 230 gas-engines, which give such a good account of themselves, through systematic attention, that the manufacturers are satisfied with their reliable and economical service. The same with lighting and heating in the factories. The Gas Company have large lighting installations in them, and the cost, the quality of the light, and the absence of eye-strain are considerations which combine to maintain a preference for the existing service. The factory owners of Northampton have obviously been educated up to the truth of things—both in regard to illumination and power.

Combination Gas and Electricity Supplies.

A kindred subject is the union of gas and electricity supplies. Much as to this has been written in our columns, and from time to time the subject has received attention through papers read before various associations. There is a great deal of scepticism in the electricity industry as to whether combinations of the kind can show economy. That scepticism may be more unreal than real, for any business man must know that, with the facilities gas-works can offer, and the absence of duplication here and there, there must be material savings. Mr. W. T. Wardale has contributed an article to the "Electrical Review," in which he says that many station engineers seem to be impressed with the idea that the town gas-engine, as a prime mover, must necessarily have so high a fuel cost as to make it unsuitable for even the smallest localities. This opinion is incorrect. To prove this, he takes a gas undertaking supplying gas at 4s. per 1000 c.ft., with a works' cost of about 2s. At this price an engine driving a direct-coupled 100 KW. generator would cost for fuel alone approximately 0·88d. per KW.-hour. This price is so high as apparently to wipe-out any resultant saving which might be made elsewhere. Details of costs, however, show that there is ample room for economy in two or three ways, and several incidental advantages. The gas consumption of a good-class gas-engine, working on an electric lighting load, with a light power load in the daytime, may be taken as 37 c.ft. per KW.-hour, making an hourly consumption when on full load of 3700 c.ft. of gas. Taking a load factor of 11 p.ct. and a yearly output of about 90,000 KW.-hours for a station containing (say) one set of 100 KW. and a light-load set of 25 KW., the total consumption will be 3,330,000 c.ft., costing, at 2s. per 1000 c.ft., £333. Comparing with a suction-gas producer, the writer points out that this will not give the best results on varying load, or short-hour working; and in the circumstances under consideration, the consumption will average all the year round 2 lbs. of anthracite per KW.-hour. This fuel will cost in most districts £3 a ton delivered; and the cost will be £240 for 80 tons a year. The saving in fuel costs over the town supply is therefore only £93. This saving is not, however, a net one by any means. Allowance has to be made for the extra cost of the engine, the added cost of the producer, and the value of the man's time who looks after the installation. A man to-day would cost the concern at least £140 a year, and would not be worth employing if he accepted less. Thus, on one item alone, the fuel saving is quite wiped-out by other and necessary items. Take next the oil-engine. Under the same output and conditions, it will be found that such engines use approximately 0·9 lb. of oil per KW.-hour. At a cost of £5 a ton delivered to the works, this entails 36 tons, costing £180. Here the saving in fuel is more substantial; the balance of advantage is, however, still with the town-gas engine for this class of work.

The Object of Combination.

The object of combination, Mr. Wardale says, is to make it possible to supply localities remote from the coal-fields, and somewhat sparsely populated, with the convenience of both electricity and gas; and to make it possible to supply electricity at a cheap rate by cutting-out as much of the overhead and management charges as possible. This is accomplished by making use of the gas-works plant and, hence, of the capital laid out in the gas-works. If this capital is to be superseded, or to be rendered of diminished value owing to competition, which cuts-off half its activity, then neither the electricity nor the gas supply will get a chance to give the community the best possible service. The electricity supply will bring more load to the gas-works. On the other hand, the use of the oil-engine would automatically take customers off the gas-mains and off the gas plant altogether, so increasing the cost of gas. In other words, the electricity business, being a customer opening up new fields, should inure to cheapening the cost of gas for all purposes, including that required for electricity generation. The article is very interesting; hence this dip into its contents.

Bad Effects of Misrepresentation.

We have been having some cold, wet, and dreary weather; and people have been lighting up their gas and coal fires. Electric fires are still not being boosted with the energy once characteristic of the electricity industry. The spasmodic use of electric fires for four or five months in the year is not compatible with the best and most profitable use of electricity generating plant; and for long-hour heating, electric fires are inimically inclined towards the pockets of householders. There is no great encouragement in these conditions. A small-consumption electric heater brings disgrace upon electric heating rather than profit to the electricity undertaking; and disappointed people sometimes are rather unmeasured in their upbraidings. There was some sensible comment the other week in the "Trade Talk" columns of "Electrical Industries." It first referred to the limitations of the bowl fire, and to the need for heed in seeing that the purchaser fully understands what it is intended to do. Indeed, the writer asserts that the sale of electric heating apparatus generally calls for much care; for with all the warnings that have been issued, one hears of consumers giving up electric heating after receiving a quarter's bill. Then comes a pregnant sentence: "Only the very short-sighted try to sell regardless of after considerations." That is true—particularly of electric fires. We have heard these so-called salesmen talking to the uninitiated about costs in a way that is bound to lead to disappointment, and make enemies of the misinformed, who will not be slow to tell their friends of how experience has refused to confirm representation. But the writer makes the mistake that many others have made. The public are not satisfied with a heating appliance in a room that can only be employed for a short time (say) per day during the approach of winter, and then again during the few weeks when it is making its exit. People want a labour-saving fire that can be used at any time and for long as well as short periods without undue heavy expense. For all and at any time, the gas-fire best answers the requirement. With the price of therms at anything between 5d. and (say) 8d. in the greater part of the country, and efficiencies of 70 to 75 p.ct., people can afford the comfort and service such fires render during the severest part of the year.

Flight of a Consumer's Account.

Electricity purveyors know what it is to have consumers whose accounts take considerable flights over those for the corresponding quarter of the previous year. That there is not a big outcry about these is probably due to the fact that a daily paper with a *penchant* for public agitations has not taken up the matter. Perhaps a reason for this is that such papers do not want a repetition of the conviction for folly that they had in the case of the gas agitation last year. Arthur Goddard, of Croydon, has had a grievance, which led to a summons for the payment of £10 13s. 9d.—the amount of his account for the supply of a quarter's electricity, which amount was much larger than for the corresponding quarter of the previous year. Upon the aggrieved one suggesting that the meter was wrong, it was tested, and found to be slightly fast, and an allowance was made in respect of that. Defendant was still dissatisfied, seeing that his account for the corresponding quarter was £1 12s. 2d., or more than £9 less than the amount for which he was summoned. Defendant would not sign the form for the meter to be tested by the Board of Trade; but, when before the Court, the Town Clerk promised that the wiring on the premises should be tested. Defendant stated that when he occupied a house on the opposite side of the road, his account only came to a couple of pounds and a few shillings. An order was made for the payment of the sum claimed. Upon this defendant remarked: "All I can say is they must not advertise that their electricity is cheaper than gas, because it jolly well is not. They can come and take their meter away, because I have done with it."

Hackney Prepayment Schemes.

When Hackney started its free-wired prepayment installation scheme, £5000 was expended. The scheme has been in operation since June of last year, and data are available, but not to us. It is stated, however, that the

period for this class of consumer has not been good, and therefore the revenue from this source has been prejudicially affected. This tells a tale. It shows the unreliability of this custom in respect of electricity consumption. Nevertheless, the Committee are desirous of continuing the scheme for a further period; and for this purpose they propose the expenditure of an additional £10,000. In this connection, they now propose to make a fixed charge for energy—8d. per unit for lighting, and 1½d. for heating and cooking, which charges will include payment for the use of the installations. One would think it would have been better to ascertain the results of the existing scheme in a normal period (seeing that the past year is reported to have been an unsatisfactory one) before indulging in further speculation. However, someone has got to pay, and, to the extent that the prepayment scheme is not remunerative, we imagine the other consumers will be affected, or the net profits will not be what they would otherwise have been. But the data are not at hand to see what has actually happened, so that we cannot speak definitely.

A Sliding-Scale for Electricity Charges.

The attempt to get the electricity supply undertakings of London into one common scheme has so far failed. But it seems from an article in "The Times" that the scheme (which we noticed some time since) of the London County Council for placating the companies is still alive, and that things have reached such a stage that they foreshadow an arrangement which will extend the lives of the companies for a further forty years—that is, from 1931 to 1971, on terms that are now the subject of discussion. It will be remembered that the scheme, while giving to the companies full control over their income up to a certain point, may provide that surplus net revenue beyond that limit shall be divided—part to go to the consumer in lower charges for electricity, and the balance to be retained by the companies. In other words, says the writer in our contemporary, "the sliding-scale principle which has worked well in regard to gas companies will be adopted." We have often wondered why this has not been done before. But a difficulty will be the standard prices for companies paying high dividends in present circumstances. The representatives of the consumers and the representatives of the shareholders may have serious differences regarding this point.

Safety!

What jocular electricians are pleased to call the "safety" of electric lighting has received further demonstration just recently in this country and abroad. On the evening of last Saturday week, the electric light failed in part of Chiswick; and several shops and a cinema were thrown into darkness. Humble candles and oil-lamps were quickly requisitioned. How thankful some people must be (who have foolishly turned-out gas and taken to electricity) that such things as candles are still made, and that oil-lamps are kept in stock by certain tradesmen. At one picture palace in the area that was affected at Chiswick, gas has been retained as a stand-by; and the proprietors and patrons were thankful for this, as, although the pictures had a rest, the band were able to play popular selections of music, while a main fuse in one of the district distributing boxes was replaced. The trouble lasted about half-an-hour. In the same papers that reported this occurrence was a message from Moscow which stated that, while a service was being held in a Kieff Synagogue, attended by some 2000 people, the electric light failed, whereupon certain individuals raised an alarm of fire. A panic ensued; and more than sixty were trampled to death and about a hundred were injured. Even in dangerous places such as mines, electricity is not a sure means of preventing accidents. In another quarter we read of the death of a miner, who died from injuries caused by an explosion, while using an electric coal-cutter. The inquest was held at Bishop Auckland; and the evidence showed that as the current was switched-off from the cutter, there was a sheet of blue flame which was followed by an explosion. It was asserted by Prof. W. M. Thornton that the cutter was unsuitable for use in a place where gas was present; and, in his opinion, there should be stricter tests of such machines. With this view, there was agreement on the part of the Coroner.

NATIONAL GAS COUNCIL.

Central Executive Board Meeting.

The Central Executive Board of the National Gas Council met at No. 30, Grosvenor Gardens, S.W., on the 9th inst.—Mr. D. Milne Watson in the chair.

Federation of British Industries—Grand Council—Appointment of Representatives.

The following representatives of the Council were re-elected.

Section 1. Main Group 9 (Chemical, &c.):

Mr. A. A. Johnston.
Mr. S. H. Jones.

Sub-Group 3. Main Group 14:

Mr. F. W. Goodenough.
Mr. A. A. Johnston.
Mr. W. E. Price, A.M.Inst.C.E., was elected to fill the vacancy on this group.

Relief of Unemployment.

It was reported that, as a result of representations made by the Council to the Unemployment Grants Committee, the Committee had agreed to recommend the Government to extend the scope of the assistance to be given to public utility companies. These proposals include the payment of 60 p.ct. of the wages bill of unemployed men engaged in connection with an "approved" scheme, and/or payment of half the interest upon the capital value of the work for a certain period of years.

Model Bye-Laws in Respect of New Streets and Buildings.

It was reported that the Building Bye-Laws were now understood to be in draft form, and that the paragraph dealing with "exempted buildings" (clause 2, sub-section D) was now worded to include buildings belonging to "any person or body of persons authorized by virtue of any Act of Parliament *to manufacture gas.*"

Factory and Workshop Act—Chemical Works Regulations.

A deputation from the smaller gas-works was reported to have met the Chief Inspector of Factories on the 28th ult., to press again for the exemption of small undertakings from the operation of these regulations. The Chief Inspector pointed out that, as a result of inquiries, in the case of most of the small works, a number of the regulations would not be applicable, in which case certificates of exemption would not be required. Certain concessions were obtained in regard to some of the regulations applicable to tar-dehydration plants, and the Chief Inspector promised to consider what further concessions might be made in respect of such plants. The result of the Council's negotiations will, it was stated, be embodied in an explanatory pamphlet, and sent to the gas undertakings affected.

Royal Commission on Mining Subsidence.

A meeting with the representatives of the water industry that morning was reported. A common policy was formulated with regard to the question, and a small Joint Sub-Committee was formed to collate evidence for submission to the Royal Commission, should an opportunity be given for the gas and water industries to be heard. Application for such permission has already been made.

Rating and Valuation Bill.

It was reported that this Bill, the draft of which had just been published, was of considerable importance to the gas industry. The main objects underlying the Bill were: (1) The simplification and improvement of the administrative machinery of rating; and (2) the substitution of a single valuation in place of the separate valuations at present required for purposes of rating and taxation. Certain hereditaments and premises, including gas-works, were defined in the Bill as "Special Properties," and dealt with in a separate and novel manner, being valued by a "Central Authority" consisting of members to be appointed by the Minister of Health upon the recommendation of the County Councils' Association and other associations representing local authorities. Other important matters—such as right of appeal, "deductions from gross value," and re-valuation—were dealt with in the Bill; but no detailed or definite principle of valuation was laid down. The Bill was not applicable to Scotland.

A small Committee was formed to consider the proposals in the Bill, in consultation with the Federation of British Industries and the British Water-Works Association.

Railway Rates.

It was reported that the important question of the "quantum" of the rates was shortly to be decided, and that objections must be lodged by the 15th inst. It was stated that the Council proposed to lodge objections in respect of the quantum of coal and coke rates and of the other traffics (sulphate of ammonia, gas oil, etc.) to which objection was previously lodged in respect of re-classification.

Alderman F. S. Phillips, J.P.

It was unanimously resolved to tender the hearty congratulations of the Council to Alderman F. S. Phillips, J.P., upon whom the freedom of the City of Salford was about to be conferred.

Scottish Salesmen's Circle.—This evening, the 17th inst., at 7.30, in Room No. 13, Dowell's Rooms, No. 18, George Street, Edinburgh, Mr. Jamieson, the President of the Association, will open the season's meetings by giving his Presidential Address.

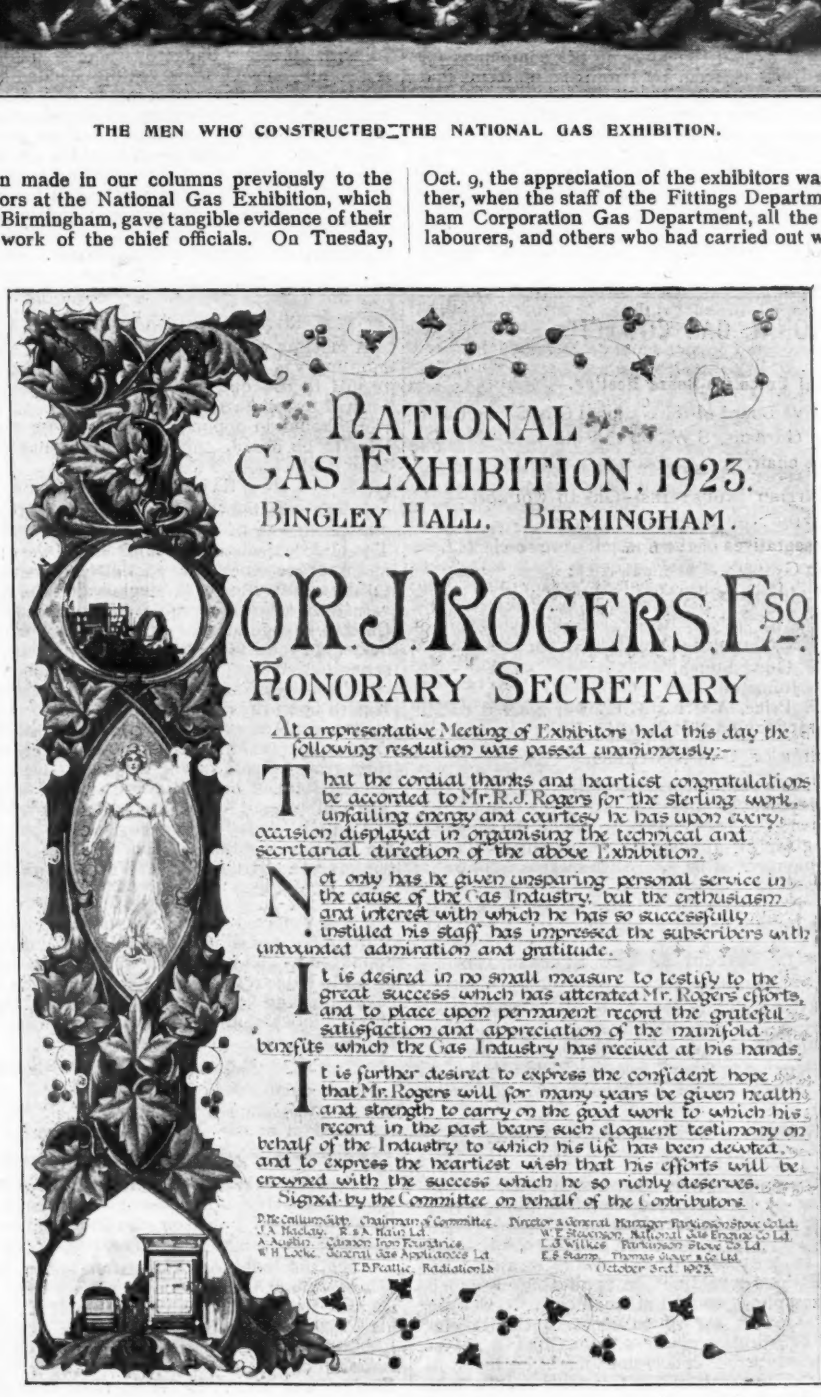
Midland Junior Gas Association.—The opening meeting of the new session will take place to-morrow (Thursday) evening, in the Council House, Birmingham, when Mr. L. H. Thomas will deliver his Presidential Address. A visit of inspection of the Physical Laboratory of the Birmingham Corporation Industrial Research Laboratories has been arranged. Dr. C. M. Walter (Engineer-in-Charge) and Mr. V. E. Green (Assistant Engineer) will explain the working of the testing apparatus installed, and demonstrate the new 100-ton tensile testing machine recently completed.

NATIONAL GAS EXHIBITION, 1923.

Exhibitors' Dinner to the Birmingham Gas Department (Fittings Staff).

THE MEN WHO CONSTRUCTED THE NATIONAL GAS EXHIBITION.

Reference has been made in our columns previously to the effect that the exhibitors at the National Gas Exhibition, which recently concluded in Birmingham, gave tangible evidence of their appreciation of the work of the chief officials. On Tuesday, Oct. 9, the appreciation of the exhibitors was carried a step further, when the staff of the Fittings Department of the Birmingham Corporation Gas Department, all the gasfitters, assistants, labourers, and others who had carried out work on behalf of the


NATIONAL
GAS EXHIBITION, 1923.
BINGLEY HALL, BIRMINGHAM.
TO R. J. ROGERS, ESQ.
HONORARY SECRETARY
At a representative Meeting of Exhibitors held this day the following resolution was passed unanimously:-
That the cordial thanks and heartiest congratulations be accorded to Mr. R. J. Rogers for the sterling work, unfailing energy and courtesy he has upon every occasion displayed in organising the technical and secretarial direction of the above Exhibition.
Not only has he given unsparing personal service in the cause of the Gas Industry, but the enthusiasm and interest with which he has so successfully instilled his staff has impressed the subscribers with unbounded admiration and gratitude.
It is desired in no small measure to testify to the great success which has attended Mr. Rogers' efforts, and to place upon permanent record the grateful satisfaction and appreciation of the manifold benefits which the Gas Industry has received at his hands.
It is further desired to express the confident hope that Mr. Rogers will for many years be given health and strength to carry on the good work to which his record in the past bears such eloquent testimony on behalf of the Industry to which his life has been devoted, and to express the heartiest wish that his efforts will be crowned with the success which he so richly deserves.
Signed by the Committee on behalf of the Contributors.
D. Milne Galloway, Chairman of Committee
J. A. Hadaway, K. & A. Radiators Ltd.
A. Austin, Glenboig Union Fireclay Co. Ltd.
W. H. Locke, General Gas Appliances Ltd.
T. B. Rattle, Radiation Ltd.
Director & General Manager Fireclay Goods Co. Ltd.
W. F. Stanesby, National Gas Engine Co. Ltd.
E. J. Wilkes, Parkinson Stove Co. Ltd.
E. S. Stamp, Thomas Glover & Co. Ltd.
October 3rd, 1923.

THE TESTIMONIAL TO MR. ROGERS REPRODUCED ON SMALLER SCALE, WITHOUT FRAME.

exhibitors generally, were entertained to dinner by them at the White Horse Hotel, Birmingham.

Mr. D. McCALLUM GIBB, of the Parkinson Stove Company, as Chairman of the Exhibitors' Committee, presided; and among those who supported him were Messrs. A. Austin (Cannon Iron Foundries), W. E. Stevenson (National Gas Engine Company), W. H. Bist (Radiation, Ltd.), W. H. Locke (General Gas Appliances), E. Stamp (Thomas Glover & Company), L. G. Wilkes (Parkinson Stove Company), E. D. Weippert (Parkinson and Cowan), and Charles Stanley (Exhibition Director).

The guests of the evening included Mr. A. W. Smith, Deputy Chairman of the Executive Committee, who unfortunately was unable to be present until late in the evening, Mr. R. J. Rogers, the Hon. Secretary of the Exhibition, Mr. J. Foster, Engineer-in-Chief of the Birmingham Gas Department, Messrs. R. G. Marsh, G. M. Lewis, F. R. Ayre, and A. Whitehead, and a company numbering about ninety.

Following the dinner, the CHAIRMAN proposed the Loyal Toast; after which the company enjoyed an excellent programme of musical items.

Mr. GIBB, in proposing the toast of the Fittings Staff of the Birmingham Corporation Gas Department, said that, in the name of the exhibitors at the National Gas Exhibition, he had to thank them for the careful, prompt, and businesslike manner in which they had carried out the work allotted to them by the Honorary Organizing Secretary. In a job which must of necessity be crowded into a limited time, when much work had to be done at short notice, it would not have been surprising if some little friction had manifested itself at times; but he could most confidently say that none of the exhibitors at the Bingley Hall had any occasion to do other than appreciate the happy spirit that prevailed, not only during the few days prior to the opening, when they were all anxious to get their stands fitted-up properly, but throughout the run of the Exhibition as well. This was not a lucky chance occurrence, but the natural outcome of the *esprit de corps* prevailing throughout the Corporation Gas Department, from the highest placed official to the humblest apprentice. Each member of the Department had spared no effort to ensure the success of the Exhibition. Well-organized enthusiasm had prevailed all the time; and the result—of which they were all so justly proud—was that the Exhibition had been declared to be the most successful gas exhibition ever held. The exhibitors were glad to have this opportunity of expressing their pride in the personnel of the Birmingham Corporation Gas Department.

Mr. A. W. SMITH, General Manager of the Birmingham Gas Department, replied, and expressed the pleasure it gave him to thank the exhibitors for their hospitality, and for the kind things which had been said about the Department. The thanks of the Department were due to the exhibitors themselves for the admirable way in which they had co-operated with them. He would also like to thank Mr. Charles Stanley, the Exhibition Director, his colleague Mr. Mogg, and his staff, for the work which they had put in on behalf of the Exhibition.

Mr. Smith then gave the following statistics relative to the work of the Department in connection with the Exhibition. Over 2¼ miles of gas-supply pipe were laid; the sizes ranging from 6 in. downwards. All supplies were tested to a pressure of 6 in. water column; and the average pressure maintained throughout the Exhibition was 30/10ths. No less than 183 orders were dealt with; and 102 meters were fitted, the sizes being from 300-light to 5-light. The number of gasfitters, assistants, and labourers employed on the work was over fifty. The gas consumption averaged 5000 c.ft. per hour during the day, and 10,000 c.ft. per hour after the lights were put on. The general lighting of the hall was carried out by 64 low-pressure lamps and 31 high-pressure lamps; while for the gallery lighting 42 low-pressure lamps were used. Gas was also installed in the various bars, offices, lavatories, entrances, and exits, and gas-heated appliances were fitted in the catering sections. Not a single report was received of insufficient supply or escape in any installation work carried out by the Department. The ventilation work also carried out included the fixing of sixteen 36 in. stream-line fans, dealing with approximately 10,000,000 c.ft. per hour. These fans were driven by 16 E.H.P. motors; and the current was generated by a 30 KW. gas-engine.

Regarding the work of the Exhibition, Mr. Smith pointed out that it was the team work which had carried it through. Every man had worked with a will; and they were as pleased as the exhibitors with the success achieved. He claimed that they had every reason to be rightly proud of the results. Referring to a remark made by Mr. Shadbolt at the "B.C.G.A." luncheon, Mr. Smith stated that Mr. Shadbolt had raised the question as to whether the spirits of the departed re-visited the scenes of their former activities. If there was anything in this theory, and the spirit of Murdoch had visited the Exhibition, the Birmingham Gas Department were proud to think that they had not disgraced the town where Murdoch lived, worked, and developed his investigations in the manufacture of coal gas. On behalf of all concerned in the work of the Exhibition, he reiterated their thanks for the hospitality they had received, and the manner in which the Exhibitors had seconded the efforts of the Department.

Mr. R. J. ROGERS proposed the toast of the Chairman and members of the Exhibitors' Committee, and stated that the members of the gas industry realized that in Mr. Gibb they had a man who was working for the welfare of the gas industry as a whole. The gathering that evening was unique in character. They had representatives of manufacturers and of the gas industry meeting round a common board. This was a fine augury for the future, for the interests on both sides were mutual. Both had to work together as cordially as possible. The success of the Exhibition was due to the co-operation between the exhibitors and the department. They much appreciated the manner in which the exhibitors, through their Committee, had shown their appreciation of the work of the Department.

Mr. GIBB briefly acknowledged the toast.

Mr. CHARLES STANLEY, the Exhibition Director, also replied. He expressed his thanks for the way in which his name had been mentioned, and stated that he desired to place on permanent record his appreciation of the work that had been done by the Gas Department. Such an exhibition could not have been held without the sound backing of the Birmingham Gas Department.

THE PRESENTATION TO MR. ROGERS.

It is with pleasure that we revert—for the purpose of publishing a photograph of the recipient, together with a reproduction of the illuminated address (without the frame which encloses it)—to the presentation made to Mr. R. J. Rogers by the exhibitors at Bingley Hall, in grateful appreciation of the assistance they had received from him. It will have been noted from the account which appeared on p. 111 of last week's "JOURNAL," that the address was accompanied by an inscribed gold cigarette case for Mr. Rogers and a diamond ring for Mrs. Rogers. The photograph of the testimonial is given on the previous page.

Mr. R. J. ROGERS,

Honorary Secretary of the National Gas Exhibition.

In his arduous work as Hon. Secretary to the National Gas Exhibition, Mr. Rogers both achieved and deserved success; and the terms of the address, generous as they are, in no way overstate the value of the services rendered by him. With the good wishes for Mr. Rogers's future that are contained in the address, we desire (as will his friends throughout the industry) most cordially to associate ourselves.

Welding Containers.

An important field for oxy-acetylene welding, according to Mr. Fetherston, in the "Gas Age-Record," is in the manufacture of tanks, vats, and containers for liquids, solids, and gases. The oxy-acetylene weld will give a strong, tight joint which can be made quickly and economically in either new or used steel plate. Lead burning is an application which will save the operator of a manufactured gas plant time and money. The agitator vats used in connection with the purification of benzole form an excellent example of these two applications of oxy-acetylene welding. These are of steel, and fitted with a lead lining. They may be made from either new or reclaimed steel sheet or plate by welding the joints by the oxy-acetylene process; and the lead lining may be fitted into place by the same means. No matter how inaccessible may be the sections of the vat where the joints in the lead lining are located, a perfectly tight joint can be made with the oxy-acetylene blowpipe.

We have received from Mrs. Cloudesley Brereton a handy-sized reprint in pamphlet form of the address on "Goodwill in Industry," which was delivered by the Right Hon. J. R. Clynes, M.P. (President of the National Union of General Workers), at the recent conference in Birmingham of the British Commercial Gas Association.

A VISIT TO H.M. FUEL RESEARCH STATION.

Interesting Work in Progress.

There is a never-failing interest to the technical man concerned in fuel problems in a visit to the Fuel Research Station at East Greenwich; and more especially when one is favoured by the company of the Director, Dr. C. H. Lander, formerly Assistant to the first occupant of the office, and his acknowledged guide, philosopher, and friend, Sir George Beilby. There is always some new work proceeding at the station, or some developments in work which has claimed previous interest; and, in every respect, work which in some way bears upon fuel economy, by efforts to ascertain how in different processes to make the best possible use of it by (let us say) varying temperatures, methods, or compositions of materials, or all combined. The work of the station is to find out things by experiment, directed by chemical and physical knowledge and theoretical considerations. Naturally, some of the work that is done produces negative results; but in a chat with Dr. Lander and Engineer-Captain J. Fraser Shaw, R.N. (the Chief Engineer of the Station), the other day, when the writer had the pleasure of again getting into intimate contact with the operations at the station, they submitted—and rightly—that even negative results have their value, in saving the time of other people in carrying-out futile investigation. It is a great waste of time to explore ground over which other competent men have made close and careful scrutiny, and have found that it is unproductive. It must also be remembered that an experiment which proves a failure as regards its main object may at the same time furnish useful data in other directions. It is because of this that there is belief, in which we share, in the value of including negative results, as well as positive ones, in the papers issued by the Department. This will explain the report which was recently published of a preliminary investigation made in the dropping of the temperatures in the Glover-West setting at the station from high to low, to obtain information as to what would happen when working the system at the lower temperatures with small variable amounts of steam, and carbonizing briquetted coal of varying compositions. We made a little criticism of that work at the time, but our knowledge of objects and results has been increased by contact with the work itself.

Preliminary Experiments in Briquetting Coals, and Low-Temperature Carbonization of the Briquettes.

In the chemical laboratory, Mr. J. G. King, the Chief Chemist, had much of interest to show us; and so had Mr. A. Blackie in the Physics Laboratory, where work is always proceeding in the testing of instruments which have some part or bearing in the researches into, or the routine testing of, fuels and gases. But it was in the Chemical Department, where, obtained on the laboratory scale, Mr. King had a number of samples of products to show of the physical characteristics disclosed by different coals, and mixtures (in varying proportions) of swelling and non-swelling coals, in the production of suitable material for forming briquettes without added binders. This was valuable preliminary investigation; the results served to guide in the work now in hand. With differing percentages in the mixtures of coking and non-coking coals, the samples show remarkable differences in physical texture and strength. There are work and results in this connection that should be valuable to all makers of coke; but what has been done here has been directed to the special purpose of obtaining briquettes which could be carbonized at low temperature, and yield a perfectly cohesive solid fuel of the form (though this is not important) of the original briquette. In the low-temperature carbonization work, while the weight of the charge per retort may be affected, a counterbalancing advantage of the use of the briquette is in the transmission of heat through the charge, by convection. But more as to this presently.

Some time ago, Sir George Beilby and those working with him at the Fuel Research Station got very much interested in the Sutcliffe-Evans, or (as known by others) the Sutcliffe-Speakman, process of preliminary briquetting; because it was seen that, if good hard briquettes could be obtained which would go through retorts, the low-temperature carbonizing problem was reduced to the simplicity of the Scotch shale process. The Sutcliffe-Evans system appeared to be quite good for certain types of coal; but with some varieties, the briquettes were friable. The work at the Fuel Research Station was directed to three ends—first, to extend the range of coals by mixing them in varying proportion to form the briquettes, secondly to assist the formation of the briquettes by heating the material to a moderate degree, and so reduce the pressure necessary to produce cohesion, and thirdly to devise some simple retort in which to carry out their carbonization at low temperatures. Sir George's idea was to attempt the formation of the briquettes at a temperature slightly below the decomposition point of coals from which good results could not be obtained in the cold. In the laboratory, briquettes on the small scale were obtained which were robust; and everything looked promising. The work now in hand consists in briquetting coal under moderate pressure—using different mixtures according to characteristics—by heating up to 350° C., and then carbonizing in cast-iron retorts of a design based upon the Scotch shale process.

In the scheme as planned, however, there were one or two points about which further data were required. First, there was the question of getting-in the heat in such a fairly open retort charge as would be provided by briquettes. As the Glover-West retorts existed at the time, the effect was tried of putting a few tons of suitable coal through them, just to ascertain whether, by dropping the temperatures, a low-temperature product could be obtained. This was the whole object of the experiment with the Glover-West retorts at low temperature. At the time, too, the station was without the proper machinery for briquetting, and without provision for heating the coal. Nevertheless, following their principle of publishing negative as well as positive results, the data were published.

Measuring Temperatures at Centre of Charges.

There is one point bearing upon steaming. The only reason that steam to a slight extent was used in these experiments was to get a somewhat greater bulk of gas into the retorts, and so give a medium which would assist in the work of convection, because in a shale retort quick work must depend largely on convection. Of course, at such temperatures as are used in the retorts, the chemical effects of the steaming on the coal are *nil*. In the experiments a tube containing thermo-couples was run down the retort, to ascertain the temperatures inside. This was done expressly to see whether the convected heat could be improved by a small amount of steaming, and to find the temperatures at the centre of the charge with various percentages of steaming with typical coal in high temperature work. When published, the data obtained by this means will be very useful.

But in this briquetting work for low-temperature carbonization and the production of a smokeless fuel, the investigators are not yet by any means out of the wood. The pre-heating plant requires modification right away; but it is believed that the retort setting that has been designed will be entirely satisfactory for the work. Anyway, no snag can be detected at this stage.

Making the Briquettes.

From the foregoing, a general idea will have been gathered of the plans along which Dr. Lander and his staff are now working for the production of a briquetted smokeless fuel. A little more detail can now be given of the actual plant and process, from the inspection that the writer made. In the first place, the coal passes through a disintegrator and then on to the heater. This is a long rotating cylinder, heated by gas-jets, which do not impinge on the metal; the waste gases being taken through the coal in the cylinder. The laboratory tests showed that the decomposition point (the sticky point) at which the best briquettes can be obtained is about 350° C.—varying somewhat according to the type of coal. At this stage, it is intended to pass the material into a rotary press designed at the station. In this the roller, instead of being circular, is to be polygonal, so as to get (from the flat surface) a better bite on the heated coal, which is filled into moulds on the periphery of the polygonal rollers. The rollers are kept up to their work by a cylinder filled with oil; and it is hoped to use the compressibility of the oil to give a spring. At the present time the briquetting is being carried out with a reciprocating press of the brickmaking type. A circular table rotates, and brings the mould opposite a ram, which passes up into the mould, and compresses the briquette against the top table. Then another step is taken by the rotating table, and another ram pushes the briquette out; a wiper then pushes it into a hopper.

It is mainly the heater part of this briquetting process that is not yet quite right. There is overheating of some parts of the coal, and underheating of others. If the average temperature should be 350° C., then there are at present fairly wide variations from this. Some particles may be overheated beyond the decomposition point, while others may be underheated, and so may not have lost their combined moisture. From both of these, gassing may occur, which causes a bursting tendency in the briquette; and this affects its stability. What is wanted is a uniform temperature to utilize the maximum effect of the binding constituents of the material. It is believed that, by the changes now being made, an equal temperature will be secured; and that so far as the briquetting stage is concerned, all will be well.

The Low-Temperature Verticals.

So far, the trials with the new form of briquettes have been made in horizontal retorts; but the results have not been quite those desired. However, as already explained, for this low-temperature carbonizing work, a very simple type of vertical retort has been designed; and with the coal in the form of an open charge of briquettes, the heat will pass into the middle more quickly than if the charge is in a dense mass in the retorts. Furthermore, the resulting smokeless fuel, being made from briquettes, will issue from the retorts with a small amount of fines. Nothing definite can yet be said as to the throughput of the retorts under the new conditions. However, we cannot do better than give at this point a description of the installation.

The setting consists of four vertical retorts (15 ft. high). These are made of special cast iron of the same nature as that used in the making of shale retorts. They are flattened oval in shape; the cross-section being slightly wider at the bottom than at the top. At the top, the retorts are 2 ft. 4 in. by 9 in., and at the

bottom 2 ft. 9 in. by 1 ft. 3 in. These retorts are connected to ordinary Glover-West extractor gear by a specially shaped connecting piece. The four retorts are fed from a single hopper, into which there is one opening in the centre; and the gas leaves each retort through an off-take pipe just below the hopper. It was thought advisable to arrange to have the off-take pipes water-cooled for a matter of about 3 ft. 6 in. from the brickwork, as previously, when using a temperature of 600° C., it had been found that the off-take pipes very soon got pitched-up. Unlike the Glover-West retorts with separate heating chambers for different sections of the length of the retorts, these retorts are set in a single heating chamber, of which the brickwork is about 1 ft. 10½ in. thick; the inside 9 in. being of firebrick. The heating is arranged for by four burners to each retort, which are placed in the corners of a rectangular space surrounding the base of the retort. The corners of this rectangle, where they are not formed by the actual corners of the main chamber, are built of brickwork, which extends horizontally into the chamber for a distance of 9 in., and vertically to a height of 10 ft. 6 in. above the floor of the chamber. The air supply for the burners is placed roughly midway between the various burners. As a result of a series of experiments, it was found that in this way the flames could be made to travel up in their corners without any considerable amount of eddying, and without causing local overheating, which it had been found otherwise difficult to avoid.

The space surrounding the hopper is kept separate from that surrounding the retorts, and the quantity of heat supplied to the hopper itself can be regulated to allow as much or as little of the flue gases to pass round the hopper as may be necessary. By this method of heating, it has been found in practice that the variation between the top and bottom of the retort can be reduced to 20° C.

As this is an experimental setting, ample provision for placing thermo-couples in various parts of the heating chamber has been made. These can be placed in fifteen positions, but habitually only seven are used. The temperature at which work is carried on is 600° C. In order to obtain this, a consumption of about 2500 c.ft. of water gas of 295 B.Th.U. is required per hour.

It might be explained that the reason the Glover-West extractor gear was used was because, when the original vertical retorts were erected, it was arranged for another setting of four similar retorts to be placed alongside; and the motors and everything were placed in such a position that they could drive two sets of extractor gear.

The settings were designed at the station and constructed by its own labour; the retorts being supplied by specialists in castings for the shale-oil industry, and the extractors by West's Gas Improvement Company. Of course, when the investigation into the carbonizing of briquettes comes to an end, the retorts can be used for experimental work on shale or lignite.

An Advantage to Gas Undertakings.

Now let us suppose that there is technical success in these plans for making a low-temperature smokeless fuel. We know nothing yet as to the working costs, or the credits on the balance-sheet from gas and secondary products. These are to come; and come they will—whether they be good or bad. That is the work of the Fuel Research Station. Dr. Lander had a ready reply to the writer's question, "Suppose all is right in these respects, supposing the public take to this fuel, how will it benefit gas undertakings?" Dr. Lander had apparently thought of this, for he at once said: "It will create for them a larger field. Gas undertakings, being located practically everywhere, have unrivalled facilities for fuel provision and distribution. At the present time their works and operations are nicely balanced; but supposing the use of gas-fires extends much more, the problem is what will happen to the coke. A quantity may be used for gas making; and it may be profitable for some undertakings to go in for complete gasification; but this does not by any means follow in all cases. In any event, there is the prospect of the balance of operations being upset by a big development in the one direction of gas heating. Therefore, if a certain proportion of the coke can be sold in this form, it seems to me this might increase enormously the business of gas undertakings as fuel suppliers." That is how Dr. Lander, looking forward, views things. And it is wise to look forward as far as possible; and to prepare the way for what one, with a fair amount of confidence, sees or believes will happen.

A Practical Demonstration.

In one of the rooms, we saw a fire burning with some of the low-temperature briquettes which had been obtained experimentally. It was beautifully incandescent, and was emitting a considerable amount of radiant heat. The only objection the writer could see to it was that the ash and dust were rather strikingly prominent. This, of course, would vary with the coals used in making the briquettes.

Steaming with Typical Coals from Various Fields.

By the way, the Glover-West installation at the station, with which so much good work has been done, particularly in connection with steaming, has been latterly devoted largely to experimental work with different types of coal. Among other varieties, Mitchell Main, Consett (Durham), Lanarkshire Main and Ell, Arley and Holmside coals have been tested. Then Dr. Lander considered it would be a good thing to get farther over the country by experimenting with a Welsh coal. With this in view, he got into touch with Mr. H. D. Madden, of Cardiff, who recommended that trials should be made with Meiros coal. That is one of the best gas-making coals in South Wales, and is one of the few that can be used in its natural state. Some 300 to 400 tons of this has been delivered to the station; and steaming experiments have been repeated with this. The station can now claim to have tried typical coals from most fields with steaming in vertical retorts; and the results, it will be found, confirm the previous work done both by the Board and the Gas Investigation Committee of the Institution of Gas Engineers and the Leeds University. The data obtained from all this work will be published in due course.

As to the future programme of work, Mr. Samuel Tagg, the President of the Institution of Gas Engineers, is now a member of the Board, and is looking into suggestions from all over the industry as to what useful work can next be undertaken. When this is decided, a programme will be framed, and presented to the Board for their consent to proceed.

Heat Losses from Metal Sight-Boxes.

An interesting point, which may be considered small by some people, but which we regard as cumulatively important, is the heat loss from metal sight-boxes in retort-settings. The Glover-West setting at the Fuel Research Station may not in some respects be regarded as typical, but in many ways useful data can be obtained which is generally applicable. In reconstruction work, the metal sight-boxes in the retorts have been replaced by fireclay boxes and plugs; and by simply getting rid of the metal, the heat losses have been reduced by one-sixth. This is an important reduction.

Miscellaneous Notes from the Power Side.

Outside the main building, a fine battery of air-cooled condensers, with separating tanks at the bottom, were seen; and then, when passing over to the power side of the station, a Columbus separator was observed, which rescues sufficient fuel for running the gas-engine suction-gas producers. Dr. Lander regards this washing and separation of good coke from clinker and ash as a very important matter in industrial fuel economy. At the station there is a variety of power engines; and it is seen that some changes have been made. The Stockport gas-engine, the Diesel heavy-oil engine, and the paraffin engine are still there. Time came when the Stockport engine would not give enough power, and the Diesel would not do what was wanted, and was found to be rather expensive. Therefore a National gas-engine was put in; and this does all that is required in generating power for motors and elevators, and charging the batteries.

Then the former switching arrangements were rather awkward. Thus what appears at first sight to be rather an elaborate switchboard was put up in the gallery of the power house. But explanation shows that what looks like elaboration is for a definite purpose. The switchboard is not merely required for distribution purposes, but for "ringing the changes" on the machines, so that proper calibration of them can be made. All the work in making the change in the switchboard was performed by the station's own labour.

The station is self-contained in the matter of workshops well equipped with machine tools. This is necessary for quickly effecting repairs and making parts. Experimental work cannot be delayed by waiting on the convenience of outside aid. Hence the value and economy of the workshop.

A Remunerative Waste-Heat Boiler.

In looking into the building containing the fans, meters, and exhausters, it was noticed that work is proceeding on the hydrogenation of oils; and in passing, Dr. Lander remarked that near the water-settling tanks they will shortly be erecting plant to carry out researches into the distillation of tars. In returning to the main building, attention was called to a Humphreys and Glasgow waste-heat boiler, which has been introduced in connection with the water-gas plant. The water-gas plant supplies all the heat required for the raising of steam for an eight-hour shift, and then the water-gas producer is run as a pressure producer, and the boiler is fired with the gas. So it is partly working as a waste-heat boiler, and for a short time with the producer gas from the one set of Humphreys and Glasgow water-gas plant. The result is that the other steam boilers at the station are not in commission, except a small one for supplying the steam to the vertical retorts. It has been calculated that this waste-heat boiler will pay for itself in eighteen months for the work of the station. It has, therefore, been a good investment for the Board. Though the ordinary steam boilers are not in use at the present time, future work will necessitate their being fired-up, with the view of making experiments in connection with economical running.

Before leaving the station, a visit was paid to the chemical and physical laboratories, where a considerable amount of interesting work is always in hand, quite apart from the ordinary routine operations.

Training Combustion Engineers.

Incidentally, while at the station, Dr. Lander referred to the scheme which the Board have for training student engineers. At the present time, they have three University graduates who have not specialized in gas or any other particular subject, but are simply being trained in fuel utilization. The first two have already passed from the station and have obtained jobs with good prospects. One of them has gone out to Calcutta to look into the question of fuel economies in boiler houses there. The scheme is simply that the students are put in charge of a job;

and they are left to it—of course, being kept under observation. One of the student engineers is in charge of the power house, but they are shifted about so as to get an all-round experience in the work that is proceeding at the station. It is really a form of apprenticeship, and the idea is to produce what will probably become known as "Combustion Engineers." This work of training young fellows in this way has been going on for three years. While at the station they are given a maintenance allowance; and there is no cost to themselves. They simply, so to speak, "work their passage."

Physical and Chemical Survey of the National Coal Resources.

A great deal of interest is being taken in this work; and considering it is opening new ground, the writer found that Dr. Lander is perfectly satisfied with the progress which has been made. But he is hopeful of considerable developments. As the results unfold themselves, the more forcibly the value of this work to the mining industry and the users of coal, and thus to the nation at large, impresses itself upon those who are engaged on it. Some information regarding this part of the activities of the Board was given in the "Journal" last week (p. 134).

As always, it was an instructive visit. The writer found a splendid spirit prevailing among all members of the staff, and a very lively concern in the whole of the details and results of their work. Not only to Dr. Lander, but to them, the writer is indebted for the interest which the visit supplied, and the information it placed in his possession.

COMMITTEE ON SCIENTIFIC AND INDUSTRIAL RESEARCH.

Report for the Year 1922-23.

The Eighth Annual Report of the Committee of the Privy Council for Scientific and Industrial Research, covering the period from Aug. 1, 1922, to July 31, 1923, was lately issued by H.M. Stationery Office, Imperial House, Kingsway, at the price of 4s. net (post free 4s. 2d.). Recommendations from the Advisory Council on the programme of research work have, it is said, brought this into conformity with the restricted means of the present times, so completing the task to which they have addressed themselves during the last two years. These recommendations, together with the automatic fall in civil-service bonus and wages bonus, have enabled the Committee to reduce the net estimates of the Department from £297,437 in 1922-23 to £276,863 for 1923 24. In a plea for co-ordination, it is remarked that during the past year it has become increasingly apparent that full use of the manifold resources already existing in this country for research can only be made if the closest co operation between the several agencies is secured. The help afforded by the universities and scientific societies is warmly acknowledged by the Advisory Council.

When the Research Associations reach the end of their quinquennial grant periods, the application of each Association desiring continued grants will be considered on its merits by the Advisory Council; but it must not be assumed that further financial assistance will be recommended in every case. There will have to be ample proof that the industry is unable immediately to shoulder the entire financial responsibility; and further aid will only be given if the industry concerned is prepared to make a rapidly increasing effort towards complete responsibility. Research Associations now in the course of their quinquennial grant periods should, it is remarked, realize this, and endeavour to place themselves on a self-supporting basis at the earliest possible date. The Advisory Council must obviously seek for evidence that an industry is striving to the utmost to attain independence and fulfil the intention of the scheme; for they realize that, so long as the State is prepared to offer financial support, an industry may desire to rely upon it.

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In addition to the presence of this temporary blind spot, there were other after-effects, due to the influence of the central stimulation, which gave rise to distraction under certain conditions. If, for instance, there was a rapid change in the intensity of light entering the eye, caused either by a shadow passing over the surface at which one was looking, by a temporary blinking of the eyes, or by a temporary increase in intensity of illumination of the surface looked at, a distinct image of the original glare of light would be produced. In a workshop where there was a centralized and intense source of illumination, there were necessarily great variations in the intensity of the work illuminated; and as the eye passed over these differences, or as shadows, due to the movement of the worker's hand, or parts of machinery, passed across the work, the whole retina was stimulated intermittently. If the worker had during the course of his work glanced at the source of illumination, or had received the glare from some bright surface of tools or machinery, projected images of varying degrees of intensity would be revived. The author had recently carried out a number of simple experiments in order to determine whether the presence of any unrecognized projected images had any effect on the accuracy of movement; and the results showed that the after-effect of the light stimulus had a considerable influence over the accuracy of work. In some subjects as much as 25 p.ct. increase in error was noticed. Naturally, there were individual differences; and in one case only 4 p.ct. increase was shown.

There were in industry countless instances in which existed conditions favourable to the formation of artificial blind spots by direct glare, or to the production of projected images, which both irritated the worker and reduced the accuracy of his work. Such conditions were: (*a*) The presence of a light centre relatively bright to the surroundings; and (*b*) variations in light intensity caused by flickering light, shadows, or irregularities in the illumination of the work. Projected after-images could be reproduced, even if the source of light were very feeble; and with such a light the author had been able to obtain clear projected images for at least eight minutes after stimulation. This experiment was carried out with a subject whose normal retention of stimulation was, comparatively speaking, low. Evidently the underlying factor antecedent to the formation of these images was that there should be a certain ratio between the intensity of light stimulus and the average intensity of light from the surroundings. In the case of a coal mine, the ratio between the intensity of the light received from the unshaded but comparatively feeble miner's lamp and that from the black coal face, would probably be as great as the ratio between the light received from a bright light in a workshop and the light received from the surface of the walls, &c. When, however, the light in the miner's lamp was surrounded by an opal cylinder, and the surface of the illuminating source was thus increased, the frequency of formation of after-images was greatly reduced. There was a field here for a considerable amount of research, in order to determine what ratio between the intensity of the source of illumination and the average light reflected from the surroundings was best suited for average working conditions.

Examining these two extremes, he said that a room might be sufficiently illuminated so far as physical standards were concerned by one very powerful centre light. The value of the ratio between the intensity of this light and the average intensity of light received from the surroundings would be large. Under such conditions, direct light, or light reflected from a polished surface of metal tools, would most certainly give rise to immediate glare effects and objectionable after-effects. If, however, instead of one powerful central light, a larger number of lights of less intensity, but giving in the mass equivalent surface illumination, were used, then the ratio between the intensity of any one of them, or the light reflected from polished surfaces and the average intensity of light received from surroundings, would be much less, and the possibility of glare effects would be greatly diminished. The points emphasized were: (1) That the use of high-powered sources of light, especially when of small area—such as an unshaded filament or a too small frosted globe—increased liability to accident through direct temporary blinding, or the still more dangerous formation of unrecognized blind spots; (2) that unless well distributed they gave rise to too big a difference between the source of illumination and the average intensity of the light reflected from surroundings, causing liability to the formation of projected images which produced unnecessary irritation and distress, and impaired accuracy of work.

THE KATA-THERMOMETER.

On two occasions during the meetings Mr. T. C. Angus exhibited and explained a new recording kata-thermometer devised by Dr. E. H. J. Schuster. The kata-thermometer is an instrument for measuring the cooling power of the surroundings over an object at the approximate temperature of the human skin. Prof. Leonard Hill has shown that the physical properties of air have, as a rule, a far greater effect on human comfort and efficiency

and they are left to it—of course, being kept under observation. One of the student engineers is in charge of the power house, but they are shifted about so as to get an all-round experience in the work that is proceeding at the station. It is really a form of apprenticeship, and the idea is to produce what will probably become known as "Combustion Engineers." This work of training young fellows in this way has been going on for three years. While at the station they are given a maintenance allowance; and there is no cost to themselves. They simply, so to speak, "work their passage."

Physical and Chemical Survey of the National Coal Resources.

A great deal of interest is being taken in this work; and considering it is opening new ground, the writer found that Dr. Lander is perfectly satisfied with the progress which has been made. But he is hopeful of considerable developments. As the results unfold themselves, the more forcibly the value of this work to the mining industry and the users of coal, and thus to the nation at large, impresses itself upon those who are engaged on it. Some information regarding this part of the activities of the Board was given in the "Journal" last week (p. 134).

As always, it was an instructive visit. The writer found a splendid spirit prevailing among all members of the staff, and a very lively concern in the whole of the details and results of their work. Not only to Dr. Lander, but to them, the writer is indebted for the interest which the visit supplied, and the information it placed in his possession.

COMMITTEE ON SCIENTIFIC AND INDUSTRIAL RESEARCH.

Report for the Year 1922-23.

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The effects of glare were so obvious that, in the majority of cases, the worker was able to take steps to prevent accident. In a comparatively short while, however, the unpleasant immediate effects of such glare disappeared, and a person was apparently free from the effect; but careful observation showed that, though not directly conscious of any blinding, there was left behind, for some considerable time, a visual area in which the vision was distinctly impaired. There was present in the eye a blind spot similar to the actual blind spot, though it was no more realized than was the presence of the blind spot itself. Experiments showed conclusively that the effects of exposure to a bright light persisted in the form of a temporary blind spot for some considerable time after the effects of exposure appeared to have passed off. This was really the dangerous period, when there was actually a centrally situated blind spot, of which the person was not aware; and it was far more likely that accidents would happen when this was the case than when the person was definitely conscious of the temporary blinding.

In addition to the presence of this temporary blind spot, there were other after-effects, due to the influence of the central stimulation, which gave rise to distraction under certain conditions. If, for instance, there was a rapid change in the intensity of light entering the eye, caused either by a shadow passing over the surface at which one was looking, by a temporary blinking of the eyes, or by a temporary increase in intensity of illumination of the surface looked at, a distinct image of the original glare of light would be produced. In a workshop where there was a centralized and intense source of illumination, there were necessarily great variations in the intensity of the work illuminated; and as the eye passed over these differences, or as shadows, due to the movement of the worker's hand, or parts of machinery, passed across the work, the whole retina was stimulated intermittently. If the worker had during the course of his work glanced at the source of illumination, or had received the glare from some bright surface of tools or machinery, projected images of varying degrees of intensity would be revived. The author had recently carried out a number of simple experiments in order to determine whether the presence of any unrecognized projected images had any effect on the accuracy of movement; and the results showed that the after-effect of the light stimulus had a considerable influence over the accuracy of work. In some subjects as much as 25 p.ct. increase in error was noticed. Naturally, there were individual differences; and in one case only 4 p.ct. increase was shown.

There were in industry countless instances in which existed conditions favourable to the formation of artificial blind spots by direct glare, or to the production of projected images, which both irritated the worker and reduced the accuracy of his work. Such conditions were: (*a*) The presence of a light centre relatively bright to the surroundings; and (*b*) variations in light intensity caused by flickering light, shadows, or irregularities in the illumination of the work. Projected after-images could be reproduced, even if the source of light were very feeble; and with such a light the author had been able to obtain clear projected images for at least eight minutes after stimulation. This experiment was carried out with a subject whose normal retention of stimulation was, comparatively speaking, low. Evidently the underlying factor antecedent to the formation of these images was that there should be a certain ratio between the intensity of light stimulus and the average intensity of light from the surroundings. In the case of a coal mine, the ratio between the intensity of the light received from the unshaded but comparatively feeble miner's lamp and that from the black coal face, would probably be as great as the ratio between the light received from a bright light in a workshop and the light received from the surface of the walls, &c. When, however, the light in the miner's lamp was surrounded by an opal cylinder, and the surface of the illuminating source was thus increased, the frequency of formation of after-images was greatly reduced. There was a field here for a considerable amount of research, in order to determine what ratio between the intensity of the source of illumination and the average light reflected from the surroundings was best suited for average working conditions.

Examining these two extremes, he said that a room might be sufficiently illuminated so far as physical standards were concerned by one very powerful centre light. The value of the ratio between the intensity of this light and the average intensity of light received from the surroundings would be large. Under such conditions, direct light, or light reflected from a polished surface of metal tools, would most certainly give rise to immediate glare effects and objectionable after-effects. If, however, instead of one powerful central light, a larger number of lights of less intensity, but giving in the mass equivalent surface illumination, were used, then the ratio between the intensity of any one of them, or the light reflected from polished surfaces and the average intensity of light received from surroundings, would be much less, and the possibility of glare effects would be greatly diminished. The points emphasized were: (1) That the use of high-powered sources of light, especially when of small area—such as an unshaded filament or a too small frosted globe—increased liability to accident through direct temporary blinding, or the still more dangerous formation of unrecognized blind spots; (2) that unless well distributed they gave rise to too big a difference between the source of illumination and the average intensity of the light reflected from surroundings, causing liability to the formation of projected images which produced unnecessary irritation and distress, and impaired accuracy of work.

THE KATA-THERMOMETER.

On two occasions during the meetings Mr. T. C. Angus exhibited and explained a new recording kata-thermometer devised by Dr. E. H. J. Schuster. The kata-thermometer is an instrument for measuring the cooling power of the surroundings over an object at the approximate temperature of the human skin. Prof. Leonard Hill has shown that the physical properties of air have, as a rule, a far greater effect on human comfort and efficiency

XUM

than has its chemical purity, and that the discomfort and fatigue experienced in badly-ventilated buildings are mainly due to an insufficient cooling power. This has had ample verification in the Rand mines, where the efficiency of manual workers has been greatly improved by altering the conditions to good kata-thermometer standards. The original kata-thermometer, besides requiring a little time and trouble in using, does not give a continuous reading. Briefly, Dr. Schuster's improvement is to alternately heat and cool the instrument continuously, and to cause the duration of its cooling periods to draw a curve, whence the cooling power of the air at any instant can be found. Thus, it is claimed that the instrument is particularly suitable for use in large buildings and mines. The cooling power of the air, in the case of the original kata-thermometer, depending on its temperature and movement, is found by the rate of cooling of a large bulb thermometer of known thermal capacity and dimensions. In the recording instrument, the lengths of a succession of cooling periods are recorded side by side on a moving paper, and a curve is thus drawn whose height at any time gives the cooling power of the air in millicalories per square centimetre per second. The original instrument, of course, was due to Dr. Leonard Hill; and the apparatus exhibited at Liverpool is a development of it, aimed at making its use more simple and less liable to any possible variations due to the human element in reading, at the same time giving the instrument a wider range of application.

VOCATIONAL TESTS FOR ENGINEERING TRADES.

Though not specifically relating to the gas industry, the joint discussion on vocational tests for the engineering trades, which was held by Sections G (Engineering) and J (Psychology), has an indirect interest, inasmuch as it deals with the methods now being adopted for selecting apprentices and young workers for various branches of the engineering industries. Summed up, the position is that the development in industrial psychology in recent years has led to the arrangement of certain so-called vocational tests, largely of a psychological nature in the first place, which the new generation of industrial psychologists claim can quite well take the place of a probationary period to ascertain whether a youth is likely to do well or otherwise at a particular trade.

Mr. M. H. Tagg (of the National Institute of Industrial Psychology) opened the discussion, and spoke of results obtained from experiments upon groups of lads at technical colleges. He maintained that it is possible to devise four or five tests which will, in fifteen or twenty minutes, give an indication of the boy's abilities or potential abilities in the trade in question, whatever it may be. He also pointed out that the majority of the large firms in Germany now select by a process of vocational selection, in preference to a probationary period. Messrs. A. P. M. Fleming and H. J. Brocklehurst agreed with the previous speaker that there should be a series of standard psychological tests in the form of an interview followed by an examination to see that the interest of boys should be stimulated in trade operations, so that by the time they left school they would have some more or less definite ideas on the subject, and be the better able to enter a particular trade. To this end, he urged that there should be lectures in schools by industrialists and visits to works by teachers. Sir Henry Fowler (President of Section G, Engineering) welcomed a joint meeting of this kind between engineers and psychologists, because there was much work for them in common in regard to vocational selection. Personally, he regarded the interview as the most valuable method of ascertaining a boy's ability; but one of the first things for the psychologists to do was to devise a method of eliminating the nervousness so common in students and others both in written and oral examinations. Prof. F. C. Lea doubted whether psychological tests could take the place of a six months' probationary period, and thought a better plan was to watch the youths during their school training and select on that basis for particular trades. Sir James Henderson preferred a six months' probationary period for an apprentice rather than relying upon vocational testing. Dr. G. H. Miles (National Institute of Industrial Psychology) said the whole aim of industrial psychology was to benefit industry by reducing the probationary period of six months for apprentices which was so common. It was felt that there was waste in this both for the employer and the apprentice; and the mere fact that there had been one or two cases in which vocational testing had not given the true result, did not indicate that the system as a whole should be discredited.

THE MECHANISM OF GAS IGNITION.

This subject was dealt with by Prof. W. M. Thornton before Section G (Engineering). The two modes of spark ignition used in engineering are by disruptive discharge at high voltage and by the arc formed at the point where a circuit is broken. The former is a well-known case of ionization by collision; but ignition does not depend solely upon the sparking voltage. There is for each inflammable mixture a certain intensity of spark necessary for ignition. Below this it is possible to pass sparks indefinitely without explosion resulting. A certain rate of production of ions is necessary, which bears little or no relation to the total energy dissipated in the spark. Ignition occurs when a critical rate of electrical activation of the combining gases is reached.

The case of the momentary arc at break is less simple. That it is mostly ionic, and not thermal, has been shown by a long series of observations, in which wide, but regular, differences between the ignitions of different gases under varied electrical conditions have been found. Recent observations on the ignition of hydrogen-air mixtures give more direct evidence of its nature. Working with alternating currents at a frequency of 250 a second, and a circuit voltage of 85, the following results were regularly obtained: After breaking a 10-ampere circuit fifty times in air alone, iron poles being used, ignition of a 35 p.ct. hydrogen-in-air mixture occurred with a circuit current of 0·4 ampere. After sparking freshly cleaned poles the same number of times in pure hydrogen, ignition of the 35 p.ct. mixture could not be obtained with less than 6·0 amperes, giving a large thick arc. It is clear that this kind of ignition also does not depend upon the energy of the arc, which is 225 times greater in the latter case. Heating the metal in hydrogen to arc temperature destroys that which causes ignition of a subsequent explosive mixture. The direct and only chemical effect of heating iron in pure hydrogen is to reduce an oxide film or to burn out oxygen absorbed in the surface. In cooling, hydrogen may be absorbed. If so, its presence greatly retards ignition, though it facilitates electron discharge.

The evidence is that ignition does not depend upon the heat energy of the arc, nor upon the total electron discharge, which is greater since the current is so much larger, but upon the emission of that which is suppressed by the hydrogen. This can only consist of oxygen normally absorbed or absorbed by the poles in contact with air and activated by the combined effect of the thermionic discharge and strong electric field at break.

The absence this year of a report from the Fuel Economy Committee is explained by the fact that the Committee no longer exist.

The meeting of the Association next year will be held in Toronto, from Sept. 3 to 10, under the Presidency of Major-General Sir David Bruce, K.C.B., F.R.S. There is in contemplation also a trip, before the commencement of the meeting, across Canada to Vancouver, and possibly also Prince Rupert and Victoria. Already special facilities have been promised by the railway companies; and the cost of the combined trip and meeting is estimated at £120—or £70 without the Western Excursion. For 1925, an invitation has been received to hold the meeting in Southampton.

THE FORTHCOMING WORLD-POWER CONFERENCE.

Considerable progress has been made in the preparations for the World-Power Conference, to be held at the British Empire Exhibition, Wembley, from June 30 to July 12, 1924, under the Presidency of the Earl of Derby. The conference is being promoted by the Council of the British Electrical and Allied Manufacturers' Association, in co-operation with technical and scientific institutions and industrial organizations in Great Britain and other countries, for the purpose of considering how the industrial and scientific sources of power may be adjusted nationally and internationally. Discussion will be directed to the possibility of establishing a permanent World Bureau for the collection of data, the preparation of inventories of the world's resources, and the exchange of industrial and scientific information through appointed representatives in the various countries.

The conference has been divided into five divisions as follows: (1) Power Resources; (2) Power Production; (3) Power Distribution; (4) Power Utilization; (5) General. These five divisions are subdivided into thirteen sections, which will deal with detailed aspects of the main subjects to which the divisions are devoted. Already a large number of papers has been promised, including one on "The Coal Resources of the World," by Sir Richard Redmayne, K.C.B., and another on "Internal-Combustion Engines," by Mr. James Richardson, and a third on "Illumination," by Mr. C. W. Sully. Other papers are under consideration. The participating countries to date are Australia, Austria, Belgium, Canada, Czecho-Slovakia, Denmark, France, Great Britain, Greece, Holland, India, Italy, Norway, Roumania, Sweden, and the United States.

Mr. D. N. Dunlop is the Organizing Director; and among other officers so far appointed is the Secretary of the Chemistry and Physics Section—Mr. H. Talbot (representing the Chemical Engineering Group of the Society of Chemical Industry). The official languages of the conference are English and French.

Aluminium for Ammonia Concentration.—In an article in the "Gas Age-Record," Mr. T. C. Fetherston states that for the past six months a large gas and coke plant in the Middle West has been experimenting with the use of aluminium pipe and aluminium castings in connection with ammonia concentration; and they report that for this purpose aluminium is giving far better service than either steel or cast iron. It is said that, prior to the use of aluminium in this connection, the cast-iron parts would be corroded in about six months to the point where it would be necessary to replace them. Based on these observations up to this time, it is estimated that aluminium parts with oxy-acetylene welded joints should give at least three times this service.

WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.

GENERAL MEETING AT NEATH.

Neath, of whose gas-works the new President, Mr. W. CLARK JACKSON, is Engineer and Manager, was visited last Thursday by the Institution for their autumn meeting. There was a good muster of members, who spent a day full of enjoyment and interest—the programme including, in addition to the Presidential Address, visits to the gas-works and the Anglo-Persian Oil Company's National Oil Refineries at Llandarcy, and a paper outlining the activities of this huge new undertaking.

The Meeting was held in the Council Chamber, Gwyn Hall; and at the outset of the proceedings the chair was occupied by Mr. OCTAVIUS THOMAS, of Pentre, the Outgoing President.

THE INSTITUTION WELCOMED.—SOME EARLY HISTORY.

The MAYOR (Mr. M. G. Roberts) said it gave him great pleasure to be present, and to welcome the Institution to Neath—more especially as they were proposing to put in the chair the town's esteemed Gas Manager, Mr. Jackson. When, however, he was asked to come and address the meeting, he wondered what he knew about gas production; and his mind wandered back to the time when he was a twelve-year old boy at school. There he came in contact with a useful little book called "Plain Teaching." This, it must be remembered, was over sixty years ago. There was in it a chapter on gas production, with an illustration of a man trying to produce gas by the aid of a kitchen fire. He had a long churchwarden pipe, with the bowl in the fire. The bowl was filled with coal, covered with clay; and the gas was passing out through the stem. This showed what gas engineers had now been doing for very many years. Though he really knew nothing about the matter, it had been his privilege to be associated with the gas undertaking at Neath. In connection with his own village (as it was then) of Briton Ferry, he also had recollections of the gas-works. Many years ago, everybody was very backward there in the realization of the importance of gas to the public; and the gas undertaking in those days was privately owned. He was sorry to say it was badly managed; and complaint was made regarding the insufficiency of the supply to the Local Authority, who passed it on to the owner. The proprietor of the works at that time was a Minister of the Gospel, who on Sunday gave spiritual light, and on the other six days of the week did his best to afford material light. But at last he said: "I cannot do any better. I have no more money to spend on the works; and the best thing you can do is to buy me up." He asked only £1800; but this was refused by the Local Authority, and the parties went to arbitration. The then Manager of the Cardiff Gas-Works represented the Local Board of Briton Ferry; and the Minister appointed Mr. Thornton Andrews, of Swansea, to look after his interests. The result was that the owner was awarded for his undertaking the sum of £6660, instead of the £1800 for which he had previously offered to part with it, and which the Local Board had declined to give him. He was very glad indeed to know that the Institution had chosen Mr. Jackson as their President. Perhaps he had not a very great deal to show the members; but, at any rate, what Mr. Jackson had got he was very proud of. He was very proud of his works, of his staff, and of his men. It was not Mr. Jackson's fault that they were unable to sell gas at a very cheap rate in Neath. The fact was they were over-burdened with capital. But considering all the circumstances, he thought the charge would bear comparison with that of other undertakings. He hoped the visit to Neath would prove enjoyable to the members individually, and of benefit to them as an Institution.

On the proposition of Mr. THOMAS, seconded by Mr. JACKSON, the Mayor was heartily thanked for his attendance at the meeting, and for his kindly welcome.

MINUTES OF THE LAST MEETING.

Mr. THOMAS (as Hon. Secretary) then read the minutes of the last meeting; and they were confirmed.

He also intimated the receipt of a number of apologies for absence.

ADDITIONS TO THE ROLL.

Proposed by Mr. A. J. BOND (Port Talbot), and seconded by Mr. B. J. BELL (Cardiff), the following additions were made to the roll of the Institution: Member: Mr. William M. Young, Gas Manager, Beaufort (Breconshire). Students: Mr. Rowland J. Williams, of Aberleeg (Mon.), and Mr. E. M. Edwards, of Neath.

THE NEW PRESIDENT.

Mr. THOMAS said it was now his pleasing duty to ask Mr. Jackson to take the chair. Mr. Jackson was so well known to them all, that no words of his were needed in introducing him. He wished him a happy and successful year of office.

Mr. W. CLARK JACKSON (who was warmly greeted) then took the chair, and thanked the members for electing him President, and for their hearty welcome. He proposed a cordial vote of thanks to the retiring President, for his able services during the past year. As President and as Hon. Secretary, Mr. Thomas had placed the Institution under a deep debt of gratitude, which they would always remember.

Mr. H. D. MADDEN (Cardiff) seconded the vote, which was unanimously passed, and acknowledged by Mr. THOMAS.

Mr. JACKSON then proceeded to deliver the following

PRESIDENTIAL ADDRESS.

Our meeting to-day in Neath, by the courtesy of the Neath Corporation and the Gas Committee, affords me another opportunity of expressing my sincere thanks for the honour you have done me by electing me as your President. This Institution has given a considerable amount of useful service in the past; and you may be assured that I shall endeavour to work heartily for the furthering of our interests during the ensuing year, and to emulate as far as I possibly can the high standard of work set by my predecessors in the presidential chair.

Looking at the present position of gas undertakings, and comparing this with the position most undertakings were in only a few years ago, we have every reason to congratulate ourselves upon the able guidance and generalship of the leaders of the industry. These gifted men, who first had the vision of an industry fully united, strong in defence, and capable of fighting with the strength that only united action can bring, must be more than satisfied with the results of their efforts. They have given new life and prosperity to the industry where stagnation and almost semi-starvation prevailed before. We Britishers are accustomed by our nature to depreciate our own efforts; but when we consider the wonderful evolution of progress, as typified in the National Gas Council, the Federation of Gas Employers, the British Commercial Gas Association, &c., and the great power of these bodies to our industry, we can honestly and heartily congratulate ourselves upon the amount of solid work accomplished.

The parent Institution of Gas Engineers has also accomplished much during the past few years. The research work carried out by them has been of the greatest value to the industry, and the education scheme recently evolved provides a further stage for technical advancement which will eventually raise the technical qualifications of gas engineers to a footing more equal to that required by other kindred engineering societies. It is also gratifying to notice the great success of the new Junior Association which has been formed in this district. The members are taking a very keen interest in its proceedings; and the quality of the work already done reflects the highest credit upon the Association. I would especially refer to the recent presidential address of Mr. T. A. Canning, which contains a wealth of sound reasoning and technical worth.

The Salesman's Association also calls for commendation. The interchange of ideas and practice which takes place at these meetings will be of the greatest value to the industry. A good salesman is like unto a pearl of great price; and these meetings are going a long way to assist in producing good salesmen.

SERVICE.

The keynote of the industry at the present time should be service. We have a first-class commodity to sell; but unless the service rendered ensures that this commodity is utilized by the consumer with the greatest possible efficiency and freedom from trouble, progress will not be anything like what it might be. Unfortunately there are still gas undertakings run more or less on the old lines of "take it or leave it;" and these do a tremendous amount of damage to the whole industry.

COAL.

The question of coal prices and quality still continues to be a vital factor in our industry; and though we may all be expecting a slight fall in prices, as compared with what have been obtaining during the past summer months, it is a certainty that we shall not in our time see a return to anything approaching the pre-war price of coal. This means that other sources will have to be examined carefully, to enable a reduction in working costs to be brought about. Electrical competition will continue to grow stronger; and our stability as an industry will depend more and more upon the two factors of price and service. With high coal prices it is surely reasonable to expect a more dependable standard of coal quality than the present one, which varies almost day by day, both in volatile and ash content—particularly in the latter. I have long been of the opinion that only by combining in some manner for the purchase of coal for an entire district, through some central executive officer, and so being able to dictate in some small measure to the colliery proprietors, can we expect to get regular supplies of clean coal. Such a supply would help considerably in lowering working costs, by yielding improved carbonizing results and reducing the wear and tear of producer furnaces.

CHEAPER PRODUCTION.

Other sources of cheaper production are being examined at the present time, principally through experiments with various types

of carbonizing plants. Complete-gasification plants are in use at several works; but the drawback up to the present has been the low calorific value of the gas so produced. This means that a doubt obtains as to the advisability of installing this method of carbonizing; a cheaper gas production being easily offset by an increased distribution charge. Low-temperature carbonization has its advocates; but I am not aware of any gas undertaking working this type of plant exclusively. The use of oxygen in carbonization has also been a matter of experiment; but, unfortunately, up to the present this has not been capable of being worked as an economic proposition, owing to the impossibility of obtaining commercial oxygen at a cheap enough rate. Valuable data in connection with oxygen production have been obtained by T. Campbell Finlayson, B.Sc., in connection with experiments carried out by him for the Woodall-Duckham Vertical Retort and Oven Construction Company; and further experiments may yet lead the way to the practical exploitation of this wonderful method of carbonization.

SCIENTIFIC CONTROL.

There is one aid to cheaper production of which everyone can make use. I refer to scientific control on the carbonizing plant and works generally. It is really marvellous how much saving can be effected by the aid of continually-applied technical supervision of the various processes. It is difficult for the smaller works to maintain an expert chemist; but I am firmly convinced that it would be a paying proposition for each of these smaller works to have the periodical assistance of a qualified chemist, who could either be loaned out by one or other of the larger works at a fixed scale of charge, or actually maintained by a number of the smaller works themselves. This chemist could pay regular visits to each works, and carry out tests on the various plants to check their over-all efficiency. There can be no doubt that this regular supervision would benefit the undertakings concerned, besides providing a valuable amount of data which might be afterwards used by the industry generally. The striving after higher efficiencies requires continual effort and application; but the trouble taken will be more than repaid by the economies which can be effected. Another source of economy available to every undertaking, but one not always taken advantage of, is the training of workmen upon efficiency and service lines. The average gas-works employee is a good fellow, and anxious enough to give improved results, providing he is put in the correct way of doing so, and treated in a fair manner for the extra efforts put forth by him. At Neath, every man is personally instructed in the best method of carrying out his work, and the various reasons underlying the methods adopted by the management. This has resulted in excellent results being obtained from the employees generally, besides giving the workmen a greater interest in their jobs.

VERTICAL RETORTS.

You will have an opportunity this afternoon of inspecting the Neath installation of Woodall-Duckham vertical retorts; and a word here as to their construction and working may not be out of place. The installation was decided upon by the Gas Committee in 1919, following upon advice given them by Mr. W. Dolg Gibb, M.Inst.C.E. After inspecting various types of plant, the Committee decided to place an order with the Woodall-Duckham Company. This was done in February, 1920; the plant being capable of producing 750,000 c.ft. of gas per day. In spite of the great difficulty experienced by the contractors in getting the material—it will be remembered that the year 1920 was one of grave industrial trouble—the plant was completed and put to work on July 14, 1921. Apart from this trouble with supplies of material, the principal engineering difficulty that had to be contended with was that of foundations; the subsoil being very bad in places, particularly at the position where it was intended to build the chimney. The foundations in each case were put down in ferro-concrete; the foundation work of the retort plant taking the form of a large reinforced concrete raft, and that of the chimney taking the form of a large ferro-concrete block tied into vertical piling. I am pleased to say that up to the present time there has been no sign of any settlement taking place in either the carbonizing plant or the chimney.

The principle of the Woodall-Duckham system is the regulated continuous descent of coal through a suitably heated vertical retort. The speed of descent is regulated so that the coal, entering at the top, is gradually carbonized in its passage through the retort, and is converted into coke by the time it arrives at the bottom. The coal is heated as it descends, and the various gases and bye-products are evolved as the coal reaches the necessary temperatures. The gases ascend, and are taken away from the top of the retort. The heating is most intense round the upper part of the retort. The amount of coal fed to the latter, and the rate at which the charge descends, are both automatically governed by the rate of extraction of the coke from the bottom of the retort. The retorts are 25 ft. long, of tapered cross-section. The walls are formed of grooved and tongued bricks, so that leakage at the joints is prevented, and are panelled out at the back so that the heat can readily pass through the walls to the charge in the retorts; a large surface being presented to the heating gases in the flues. The heating flues are vertical; the division walls of tongued and grooved bricks being bonded into the walls of the retort and also into the back walls of the flues, thus forming a very strong and simple construction. The gas from the producer, and the secondary air from the regenerator are admitted at the top of the vertical flues, and burn downwards. The generator is of ample dimensions, and the depth of fuel from the firebars to the gas off-take is always constant. The regenerator has about 10 p.ct. greater area than is usual with horizontal settings of the same capacity, and is of the tubular type. Dampers are provided at the bottom of the retorts, so that the pull can be regulated to each side of every retort. Main dampers are provided on the waste gas outlet of the regenerator. The coke extractor at the bottom of each retort is fitted with a specially-designed device for regulating the discharge of coke. Below the extractor roller is fitted a large cast-iron receiving hopper; the bottom of the receiving hopper being sealed by means of a gastight door. The coal-feeding device at the top of the retort is by means of a gastight auxiliary hopper; this being in communication with the overhead storage bunker by a special circular gastight valve. The gas off-take pipes are of large area, and fairly easily cleaned. Each retort is provided with a special foul-gas valve; this valve being one of the best I have come across for the work. The coke is discharged into bogies running on a small track underneath each line of retorts, and is taken by hand to an electric lift and raised either to the gantry level, where it can be tipped direct into wagons or on to the yard tips, or taken up to the coal-bunker level, whence it is fed into the producers by merely opening a special valve. Apart from the initial small troubles one naturally expects with a new plant, and which were all successfully got over within the first three months of running, the plant has continued to give excellent results during the two-and-a-quarter years it has been in use. The retorts to-day look in as good condition as when they were first heated up, and the general wear and tear has been remarkably small. Ordinary Welsh coal is used; the best results being obtained when a mixture of Monmouthshire and local coal is worked. The figures obtained during the year ended March 1, 1923, are as follows:

Make of gas per ton of coal carbonized	17,276 c.ft.
Declared calorific value	425 B.Th.U.
Therms per ton of coal carbonized	73·4 therms
Coke sold per ton of coal carbonized	6·4 cwt.
Tar " " " "	9 7 galls.

Owing to the sulphate of ammonia plant being out of commission for the larger part of the year, the full year's results cannot be given; but the average taken for the months the plant was in use amounts to approximately 17 lbs. of sulphate per ton of coal. The carbonizing wages work out at 2·2d. per 1000 c.ft. The annual charges for repayment of loan capital and interest on the plant amount to 5·8d. per 1000 c.ft.; and as the saving in productive costs, as compared with the old horizontal plant, amounts to 11d. per 1000 c.ft., there has been a net saving with the vertical plant of 5·2d. per 1000 c.ft., representing a total of approximately £3000 per annum. In addition, there are numerous other advantages with the vertical-retort plants which cannot be put into money terms, but which affect the general results considerably. These include cleanliness of the stoking operations, greater flexibility to meet varying gas outputs, less wear and tear of plant generally, and infinitely better conditions for the stokers themselves—no small matter with the modern type of educated workman. The plant is under the direct charge of a Junior Assistant, who carries out daily tests of the producer and waste gases, retort temperatures, chimney pull on the bench at various positions, &c., and who also exercises a general control, subject to my personal supervision, on the whole of the plants working. The average working temperature of the retorts is approximately 1150° C. at the top combustion level; the bottom heats being approximately 800° C. The waste gases, immediately after passing through the regenerator, average approximately 550° C. Working in conjunction with the vertical-retort plant is a Spencer-Bonecourt waste-heat boiler. This boiler is capable of evaporating 1200 lbs. of steam per hour on waste heat alone, and also has eighteen special auxiliary tubes fitted for burning producer gas, which when in use along with the waste heat from the settings brings up the evaporation to 1800 lbs. These tubes were connected up to a take-off pipe from the producer settings; but I have now discontinued this arrangement, and at the present time the boiler is working on waste heat alone. It is intended, however, to fit a separate producer of the "Walker" type; this producer being available in the near future for removal to Neath from the Briton Ferry Works. At some future date, I hope to be able to give this Institution fuller particulars, of a detailed nature, of the working of this class of boiler. As I have said before, the installation of vertical retorts has given practically no trouble at all since it was brought into use, and has proved that this type of plant can deal satisfactorily with local Welsh coals.

DISTRIBUTION.

On the distribution side, a considerable amount of work has been done in laying-down central feeding mains for ensuring a more equal supply of gas to the various districts. Most of this piping has been put down in steel, with long sleeve joints. I propose, however, to use welded joints on the next large main extension.

PUBLIC LIGHTING.

This is always a good advertising medium for any gas undertaking; and too much effort cannot be put into the work of ensuring that the public lighting in any district is kept at the very highest possible efficiency. There are many excellent types of lamp now on the market for this purpose; but I find that, even

after fitting the very best type of lamp, it is still essential, if the lighting is to be maintained at its best, to exercise strict supervision over the human factor.

SHOWROOMS.

It is also essential, from an advertising point of view, that gas undertakings should have the assistance of a well-equipped showroom. This is not always possible, particularly with municipally-owned undertakings, but there can be no doubt as to the valuable amount of benefit a well-equipped showroom brings.

MAINTENANCE OF CONSUMERS' LIGHTS, &C.

I am a strong believer in free maintenance of consumers' lights and fittings. By this I mean that the necessary service should be given by the gas undertaking to ensure that the consumers' burners, fires, and cookers are all being used in the most economical manner. At Neath, this system has been in use for several years; the work being done by specially-trained young women, and each consumer being visited at approximately half-quarterly intervals. The amount of business these young women bring to the undertaking is very great, particularly after they have gained the confidence of the consumer and when the latter begins to appreciate that the gas undertaking is out for service all the time. After deducting the profit on sales actually made by these women, the actual cost of maintaining this service at Neath is less than one farthing per 1000 c.ft.

NATIONAL GAS EXHIBITION.

I cannot let this opportunity pass without referring to the recent National Gas Exhibition held at Birmingham. Those of us who were privileged to attend this exhibition must have been struck not only with the excellent lay-out of the exhibition, but by the variety of uses to which gas was being efficiently utilized. As part of my department's educational scheme, a party consisting of twelve of the employees was given the opportunity of inspecting this exhibition; and I am perfectly satisfied that the educational value to these men will enable them to render more efficient service to the department and its consumers, and that the expense will be repaid with large interest.

Our industry can be reckoned as being one of the indispensable services which modern civilization requires for comfort and well-being. An extended use of our commodity will benefit the community by materially assisting in purifying the atmosphere of the towns, besides still further reducing the arduous labours connected with household work. Educating the public mind will assist towards attaining this end; but, in addition, the two factors of price of gas and service to the consumer must never be lost sight of. Only by such a combination can this Utopian ideal be brought within the reach of practical politics.

CONCLUSION.

By the courtesy of the Directors and Manager of the National Oil Refineries, an opportunity will be given the members of this Institution, this afternoon, to visit and inspect the Oil Refinery at Llandarcy, Skewen. This visit will be of very great interest, for the Llandarcy Refinery is one of the most up-to-date and best-equipped refineries in the world.

I would again thank you, gentlemen, for the honour conferred upon me; and I trust that the day's proceedings will be both interesting and instructive.

THANKS TO THE PRESIDENT.

Mr. W. H. JOHNS (Swansea) said he was sure they had all been very greatly interested in the address, which they had known beforehand would be a good one. A great number of points had been covered. He (the speaker) would like to emphasize the necessity of all of them to endeavour to instal the type of plant that was best suited to their own particular conditions, with a view to supplying gas to the public at the lowest possible cost. After listening to Mr. Jackson's address, they would all go home with the feeling that there were plenty of opportunities to be taken advantage of to bring down prices. His figures would act as an incentive to them to do their best. Doubtless the plant at Neath was the best that could have been chosen for their particular requirements; and the data quoted by the President showed the advantages that had been obtained. They all wished him success, both as President of the Institution and in connection with the undertaking of which he was the head. He proposed a hearty vote of thanks to Mr. Jackson for his address.

Mr. T. E. FRANKLIN (Barry), in seconding, remarked that they had listened to an able, thoughtful, and, above all, practical address. When they came quietly to think over all the points that had been put before them, they would derive a great deal of benefit from what the President had told them.

The expressions of the mover and seconder were heartily endorsed by the meeting.

REPRESENTATIVE ON THE COUNCIL OF THE INSTITUTION OF GAS ENGINEERS.

Mr. J. PROSSER JONES (Caerphilly) proposed that Mr. Jackson be the Institution's representative on the Council of the Institution of Gas Engineers for the year commencing June, 1924. He said he would like to add his meed of praise with regard to the address they had just heard. It showed that the Council were fully justified in electing Mr. Jackson to the chair.

Mr. A. E. DAVEY (Aberdare) seconded the motion, which was agreed to.

SPECIAL PURPOSES SECTION.

Mr. J. H. CANNING (Newport) submitted the thirteenth annual report of the Committee of the Special Purposes Section (from 1921 to 1923), and moved its adoption. He remarked that they all knew the very useful work which the Section had carried out since first it was initiated. It was started at a time when there was no other organization of the kind in existence for them; and it had certainly been of great benefit to all the undertakings in the district. It would be remembered that some years ago the question was discussed as to whether this branch of the Institution's work should be continued; and for very good reasons it was decided to carry on. In his opinion, they would be well advised to go on with it. All the members had had a copy of the report and of the accounts, which showed the Section to be in a flourishing condition. Now they had fully re-commenced their activities. Possibly some of them might not quite understand why for some years the Section had not been able to do as much as might have been wished. It was very largely owing to the Government control, which took things to a great extent out of their hands, and so placed it beyond their power to do anything much to assist themselves. Now, however, they had started their meetings again, and had begun work of importance to the gas industry of the district. There was every hope that in the future they would be able to do even more for the industry than in the past.

Mr. J. A. BOUCHER (Maesteg) seconded the resolution, which was unanimously adopted.

DISTRICT ASSOCIATION REPORTS.

The HON. SECRETARY then introduced the subject of the proposed revival of the volume of combined "District Association Reports," which for the past few years has not been published. He pointed out that the Manchester District Institution had taken up the matter with the Proprietors of the "JOURNAL," and an endeavour was being made to guarantee a sale of 750 or 1000 copies. If their Institution decided to join in the scheme it would mean an increase in the present subscription to cover the cost of the volumes that would be handed to the members. Before moving a resolution to this effect, he would like to hear the opinions of members on the subject.

The PRESIDENT said he was firmly convinced of the advisability of a copy of these reports being in the hands of every member, for reference purposes; and he therefore hoped they would agree to the necessary increase in the subscription.

Mr. CANNING and Mr. MADDEN both expressed agreement with this view.

The HON. SECRETARY thereupon proposed that the annual subscription be increased from 10s. 6d. to £1, to cover the cost of these "Transactions" and leave a little surplus. Also that the students be asked to pay 9s. 6d. a year, which would be the cost of the volume.

Mr. B. J. BELL seconded this; and it was passed unanimously.

THE NATIONAL OIL REFINERIES, LLANDARCY.

Mr. B. S. WRENCH then read a paper descriptive of the National Oil Refineries at Llandarcy, which will be found on p. 193.

Mr. MADDEN subsequently remarked that the magnitude of this huge oil works had been a surprise to him. While listening to the author's apt description, his mind had gone back to the time when, in London, they took up the big carburetted water-gas plants. Then, so far as they knew, oil was oil; but they soon discovered that there was a very great difference indeed in these mineral oils. Working under Sir Boverton Redwood and his assistants, he learned more about oil in two or three months than he had ever imagined before. This big oil refinery was really akin to their own industry; and even in the welfare branch, to which Mr. Wrench had referred, they were following on much the same lines as the gas industry. He moved a hearty vote of thanks to the author for his paper.

Mr. E. ABLETT (Swansea), in seconding, agreed that there was certainly a very close connection between oil and gas undertakings, and said he was sure that the detailed manner in which Mr. Wrench had described his own processes would make them regard sympathetically the difficulties of the oil people.

The vote was heartily passed, and acknowledged by Mr. WRENCH, who said this was only one of many happy associations he had had with their President.

THE NEATH CORPORATION.

Mr. CANNING proposed a hearty vote of thanks to the Neath Corporation for welcoming the Institution to the town, and allowing them the use of that splendid hall for their deliberations. They would, he pointed out, never be able to carry out their activities were it not for kindnesses extended to them in this way. Included in the vote should be the name of the Mayor, who, in spite of his many engagements, had found time to come and address them. What he had said pointed a very strong moral—that it was dangerous to try and carry on without proper technical advice. Those who owned gas-works, should take the moral to heart.

The HON. SECRETARY seconded the vote, which was heartily agreed to.

PLACE OF NEXT MEETING.

On the motion of the PRESIDENT, it was left to the Council to decide the place for the next meeting.

XUM

Luncheon.

At the invitation of the President (who occupied the chair), members and friends to the number of more than fifty sat down to luncheon in the Castle Hotel. After the honouring of the Loyal Toast, Councillor Jones submitted "The Wales and Monmouthshire District Institution of Gas Engineers and Managers." He remarked that the owners of gas undertakings could not fail to benefit from the knowledge gained by the members of the Institution from gatherings of this kind. He had been a member of the Gas Committee ever since Mr. Jackson had been in charge, and was glad to think they had made him their President. They could not have a smarter man; and he felt sure he would render the Institution distinguished service. The President acknowledged the toast; and then Mr. Madden proposed "The Town and Trade of Neath," which was replied to Councillor Williams and the Town Clerk (Mr. Curtis).

At the Gas-Works.

The members were next conveyed in motors to the gas-works, where an interesting time was spent inspecting the plant to which reference had been made by Mr. Jackson in his address.

The works were purchased from the old Neath Gas Company in 1874; the sum paid being £33,000. The yearly output of gas at that time was 15 million c.ft. The present output is 140 million c.ft. per annum; and with the developments that have recently taken place in the district in connection with the National Oil Refineries, the output is likely to increase very rapidly in the near future. The land upon which the works stand is about 4½ acres in extent, and is sufficient to provide for future extensions over a large number of years.

The carbonizing plant consists of an installation of Woodall-Duckham vertical retorts, with a daily capacity of 750,000 c.ft. There is, in addition, a carburetted water-gas plant, by Messrs. Davidson and Partner, with a daily capacity of 400,000 c.ft. Both these plants are fitted up with the latest improvements. The coal is brought into the works on a private siding, in direct communication with the main line of the Great Western Railway. The whole of the coal-breaking and elevating plant is motor driven; the electrical current being generated by means of a 34 kilowatt dynamo, coupled to a 60 h.p. "National" gas-engine. The works have been considerably re-modelled during the past few years, including alterations to the plant generally, building of a new fitting shop, cooker shop, &c. A considerable amount of work has also been carried out on the district, including the laying of a new 16-in. trunk main, and several miles of new 8-in. main to the housing site at Llandarcy Oil Works.

The Neath Corporation have recently absorbed the Briton Ferry Urban District Council; and it is proposed in the near future to supply the whole of the gas to Briton Ferry area from the Neath works. The plant at Neath was put in of such a size as to be capable of dealing with this increased output. The centralizing of the manufacture at the Neath works will result in considerable saving being effected in the cost of production. In connection with this centralizing, it is proposed to lay down at an early date a new 10-in. steel main, coupling-up the Neath works with the Briton Ferry mains.

Visit to Llandarcy.

Leaving the gas-works, the motors proceeded to Llandarcy, and through the model village, to the magnificent new works of the National Oil Refineries, Ltd., some account of which the members had had presented to them at the business meeting earlier in the day. Under the guidance of Mr. A. M. O'Brien (the Works Manager), Mr. B. S. Wrench (who had read the paper referred to), and other members of the staff, the visitors gleaned much information as to what has been, and is going to be, done in connection with this important undertaking, which is owned by the Anglo-Persian Oil Company, Ltd.

It was a bold step which those responsible took, in thus building a complete model refinery on the shores of the Bristol Channel, 6000 miles away from the source of production of the oil; but it is gratifying to learn that, even at this early stage, the move has more than justified itself. From the consumers' point of view, it is urged that one of the many advantages of refining oil in this country is that it enables the refiner to manufacture readily, and under most advantageous conditions, the various valuable products from petroleum—such as motor and aviation spirits, white spirit or turpentine substitute, kerosene or lamp oils, gas-enriching oil, various qualities of lubricating oils and grease, several grades of paraffin wax suitable for industrial purposes including candle manufacture, fuel oils for direct steam raising and for internal-combustion engines, road pitch, &c. The manufacture of many of these things is not practicable at the source of production, owing to climatic difficulties, cost of packing and transport of the finished goods as compared with transport in bulk to the consuming market of the crude oil, and for other reasons.

Glancing round upon all that has been accomplished at Llandarcy, it is difficult to realize that, although the project for the creation of this refinery was part of the comprehensive policy decided upon by the Anglo-Persian Oil Company prior to the war, the Company only secured possession of the property from the private owners and the Swansea Harbour Trust five years ago, and practically no work could be done in connection with the plant until after the close of the war. Actual operations were started in February, 1919, with the building of a spur railway from the main line of the Great Western Railway to the refinery site in the neighbourhood of Skewen. A few months later work was commenced on the model village, where a number of the workers are housed. The construction of jetties for the oil-tankers at Swansea Harbour, the development of a subsidiary tank farm near the docks for oil in transit, and the work of laying the series of pipelines to the main tank farm, about 4 miles distant, were also proceeded with.

Some idea of the efficiency of the organization that has been built up is to be gathered from the fact that a 10,000-ton oil-tanker can discharge its cargo into the first series of tanks, which are situated near the docks, in approximately twelve hours; while a vessel of the same size taking away a cargo of refined products can load in about twenty hours. Immediately each vessel docks, its pumps are connected by flexible piping with the pipelines which run from the berths to the tanks on an area adjoining the docks. There are six of these pipelines, their size ranging from 8 to 12 in. in diameter. Two of them carry the crude oil from the ships, and the remaining four bring back the refined products, which other vessels then convey away. The tanks at the docks are capable of holding 80,000 tons of oil; and from these the crude oil is forced by powerful electrically-driven pumps along the pipelines to the main tank farm, where the combined storage capacity for crude oil or refined products is something over 75,000,000 gallons. The six pipelines connecting the dock storage with the tank farm comprise some 34 miles of large-diameter pipes.

An object of interest to the visitors was the look-out tower, from which every part of the refinery and tank farm can be seen; a searchlight that is mounted there enabling observations to be made at night. In fact, throughout the place elaborate precautions against fire are taken, a special staff of fire-fighters and the police co-operating for the purpose. A notable instance of the careful guard against fire risk is to be found in a number of curious-looking fireless locomotives—known at the refinery as the "Thermos Flasks," from the fact that they operate on bottled steam, a charge of which enables them to run for a considerable time. In an oil refinery the careful use of fuel is of the first importance; and at Llandarcy the question of heat conservation has been carefully considered, so that the total fuel consumption is maintained at an extremely low figure. One means to this end is the introduction of heat interchangers, which utilize the heat from the vapours of the stills, and from certain residues, to raise the temperature of the cold oil entering the system. An idea of the care taken to conserve heat may be gained from the fact that in cold weather snow is said to remain unmelted on the pipes which are carrying live steam from the boiler-house to the various units surrounding it, thus showing the perfection of the insulation methods employed throughout the installation. Oil firing is generally used throughout the refinery. This great enterprise at Llandarcy has taken three years of continuous work and three millions of money to bring to completion.

A busy and thoroughly successful day was brought to a close with tea upon the return to Neath.

AN ACETYLENE HANDBOOK.

We have received from the publishers, Otto Spamer, of Leipzig, a copy of the second edition of "Das Acetylen." Prof. Dr. J. H. Vogel, the author, set out in 1910 to contribute, to a chemical technology series under the auspices of Prof. Dr. A. Binz, of Berlin, a comprehensive handbook dealing with acetylene in all its aspects. In his introduction to the second edition, the author explains that the strides made in the knowledge and practical application of his subject in the last ten years have necessitated a very considerable extension of the volume, and a complete re-writing of a large part of it. In extending his text from the 281 pages of the first edition to 409, Dr. Vogel acknowledges the invaluable assistance of Dr. A. Levy-Ludwig, Prof. H. Richter, Dr. Armin Schulze, and Dr. Steil, who have all dealt with their own specialized branches of the subject. The result is a very comprehensive treatise on acetylene—from the chemical, physical, hygienic, and technical points of view, its manufacture, its application to domestic and industrial uses, lighting, heating, cooking, welding, internal-combustion engines, &c.

The text is fully indexed, and contains 180 illustrations. It is published at 14s. in paper cover, and 18s. bound.

Co-Partnership Schemes.—Speaking on the subject of co-partnership, Colonel J. H. Boraston, a Director of the South Suburban Gas Company, said that the idea was not a new one. The first scheme was started a hundred years ago. Since then one-half of the schemes promoted had failed; but he preferred to regard this merely as a natural result of experiment. If the only object in promoting a co-partnership scheme was to get better work from the worker, it was very likely to deteriorate into an attempt to exploit the working man. If the idea was to get better profit, this would merely be an effort to get a greater return from the employee; and it would be difficult to prove to him that he was getting a fair deal from his employer. On the other hand, workers must realize that unless profits were earned they could not expect to obtain their share.

NATIONAL OIL REFINERIES, LLANDARCY.

By B. S. WRENCH.

[A Paper read before the Wales and Monmouthshire District Institution of Gas Engineers and Managers, Oct. 11.]

In view of the visit of the members of the Institution to the National Oil Refinery this afternoon, we have been asked to give you a short description of the process of oil distillation, and also a résumé of the process from the original drilling for oil in Persia to the finished product at our refinery. Needless to say, the time available is so limited that, with such vast material to deal with, it is impossible to give you anything other than a very superficial outline of our operations.

HISTORY AND DEVELOPMENT OF THE COMPANY.

In passing, just one word on the history and development of the Anglo-Persian Oil Company, Ltd.—the parent of the National Oil Refineries, Ltd., and many other companies. The idea of developing the huge oilfields in Persia was first conceived by Mr. D'Arcy, an Australian by birth, and a patriot by nature; and his first idea was to found for the British Empire an oil company which was British in every respect. A considerable fortune of his own money was spent in searching the world for suitable oilfields. In 1903 he discovered the Persian Oilfields, and immediately obtained concessions from the Persian Government; and in order to obtain the necessary financial assistance, Mr. D'Arcy approached the only all-British oil company existing at that time—namely, the Burmah Oil Company, Ltd. Mr. D'Arcy's hopes were fully realized; and finally, in May, 1914, the British Government of that day agreed to invest some two millions of money in the Company, which is now known as the Anglo-Persian Oil Company. The position to-day is that our Government is one of the large shareholders in the Company. At present the staff of the Anglo-Persian Oil Company and its subsidiary Companies is considerably over 50,000.

BORING FOR OIL.

As has already been said, the oil wells of our Company are situated in Persia. The original field covers an area of not less than three square miles. One of the wells in this field has produced as much as 650,000 tons a year, or a little under half-a-million gallons per day. The average depth of these wells is 1380 ft.; but there is at least one over 3500 ft. deep. The sinking of the wells is tedious; and progress at the rate of 25 ft. a day is considered satisfactory. When the drill actually penetrates into the oil sand, the oil, owing to the subterranean pressure of petroleum gas, rises to the surface. The drills are withdrawn into the casing pipe, which is above ground, the valve shuts-off the pipe leading to the top of the derrick, and another is opened so that the oil flows away by means of a side pipe to a spot at some distance, where it is sometimes deliberately fired. This is to prevent the oil and gas interfering with those working round the rig. When all is ready the valve leading to the emergency outlet is closed, and another side valve from the well head is simultaneously opened. Through the latter the oil flows into the pipes leading to storage. This well has then been "brought into production." The production for the year 1922 from fifteen wells was 2,300,000 tons, which has since been increased very materially, for there were at that time a number of wells drilled to within a few feet of the oil sand, and could thus be brought into production very rapidly.

TRANSPORTATION.

The oil is generally brought down from the wells by means of 2 ft. 10 in. pipelines. There is a pumping station at the head; and at intervals boosting or auxiliary pumps are erected to reinforce and maintain the necessary pressure. The length of the pipeline between the wells and the dock at Abadan is 146 miles. Having arrived at Abadan, which is about 47 miles from the Persian Gulf, it is conveyed by the fleet of tankers—constituting what may be termed a floating pipeline—owned by the Company, which bring the oil 6000 miles from its source of production to Swansea for refining. On arrival at Swansea the boat is berthed in the Company's dock, and the oil is pumped by the ship's pumps to one of the 10,000-ton storage tanks at the auxiliary tank site, at a rate of 500 to 800 tons per hour. It is then pumped to the tank farm at the refinery, a distance of 3½ miles. At this tank farm you will observe about thirty tanks; each of these, with but few exceptions, holding 10,000 tons, which, by the way, is the full cargo of one of the largest tankers. The total storage capacity is over 75,000,000 gallons. The oil is now pumped to one of the storage tanks on the hillside of the refinery, in readiness for distillation.

The land on which the refinery stands was acquired prior to the war. It was, however, not till February, 1919, that actual operations could be commenced; the area now occupied by the extensive plant and tank farm being at that time a waste of rabbit warren and low-lying land. When it is said that the plant was put into operation in June, 1921, the amount of work carried out during the period 1919-21 will be readily appreciated.

STEAM PRODUCTION.

We shall proceed by way of the main-office block on the left to the boiler-house, where are, side by side, the two most modern methods of steam raising—namely:

(*a*) Coal firing by automatic methods.
(*b*) Burning oil fuel.

The steam generated here is required for use on the stills, and also for the steam turbo generators. For coal firing, the coal is received direct from the trucks into elevators conveying to bunkers with a capacity of 170 tons each. It then falls on to the hearth; the empty elevators returning on the other side of the building in an endless chain, and repeating their work. For the oil-fuel fires the well-known "Howdens" or "Wallsend" pressure system is adopted. The steam is generated at 180 lbs. pressure; and after doing active work in the turbines, exhaust steam is drawn off at a reduced pressure of 40 lbs. per sq. in. Steam is also conveyed by means of a high-pressure main, approximately half a mile in length, to certain stills. The boilers are each capable of evaporating 25,000 to 30,000 lbs. of water per hour, according to the nature of the fuel used.

POWER GENERATION.

From the boiler house we shall proceed to the power house. Here there are three turbines running at 3000 r.p.m. These are connected to A.C. generators of 2500 K.W. capacity at a pressure of 3300 volts, which is transformed to 440, and by static balancers to 250 for lighting. Condensers are fitted to allow the turbines to be run as simple high-pressure turbines when necessary. The switchboard in this power house, which is absolutely foolproof, each cubicle being under lock and key, has interlocking and isolating links, and is spoken of as one of the finest in the country. If the exhaust steam is in excess of that required for distillation purposes, the remainder is automatically passed through the condensers, whereby a good vacuum is maintained.

The air-cooling plant in this building is commonly known as a wet-air filter. Water is circulated by a small pump in the form of a spray. The air is drawn through this spray by a fan on the shaft of the generator, all dust is collected, and the air passing through is both cool and clean.

CRUDE OIL DISTILLATION.

Leaving the power house, we visit the crude-oil distillation units. Here the oil from the tank farm is received for the first time at the refinery. The steam from the boiler-house is superheated by oil burners of the "Kermodes" gravity-feed and steam-atomizing type. The average temperature of the hottest still is approximately 225° C. The actual operations on this still will be explained to you on the ground. The effect of this distillation has split up the crude oil into two parts:

(*a*) Fuel oil.
(*b*) Crude benzene, known technically as once-run distillate.

The fuel-oil portion is then ready for pumping back to the docks at Swansea or to the railway siding on the works, for market, or for passing through the works for further treatment for obtaining lubricating oil, wax, and other bye-products. The spirit portion obtained from this distillation flows by gravity to the benzine refinery, for washing and further splitting.

Now we will follow the fuel-oil portion through the refinery. At the pitch bench three cuts are taken off:

(*a*) Heavy kerosene.
(*b*) Gas oil.
(*c*) Heavy oil and paraffin.

The heavy-oil and paraffin portion is then conveyed to the paraffin sheds, for the extraction of bye-products. The compressor house of this plant, which will be the next visited, is said to be probably the finest in the United Kingdom as regards design, though, of course, not the largest. In the next room there will be seen a series of columns known as Thompson's coolers, through which cold brine is circulated. The oil is chilled here, and is prevented from solidifying by a stirring gear. It then passes into the presses in the cooling rooms, where there are 18 to 20 degrees of frost.

FILTRATION.

The oil is pumped through the filter presses, leaving a residue of scale or crude wax. The liquid filtrate, which forms the base of lubricating oil, is then passed on for further treatment through the new sulphur-dioxide plant, now nearing completion. The scale is passed through the hydraulic press house, melted, and then pumped to sweating stoves. The latter contain cylindrical vessels having an annular space filled with scale. These are gradually heated by steam, and the oil sweats out of, and drains away from, the wax. After this treatment, the wax is run off in a molten state to the wax refinery, where, after being filtered through bauxite, it is passed into the wax run, which is filled with trays. The wax is then ready for market.

A visit will be paid to the chemical laboratory, where will be seen some of the thousand tests a day referred to in the advertisements of "B.P." spirit.

Before proceeding to the final distillation unit, the bauxite filters will be examined. The crude spirit already referred to has now been split into two parts:

(*a*) Benzine (petrol).
(*b*) Kerosene (paraffin).

The paraffin portion is received in this section of the works, where it passes through a filter composed of granulated bauxite—a reddish-brown aluminium ore—which removes the sulphur, and renders the kerosene sweet and colourless. The latter is then ready for the market. The benzine refinery will next be visited. Here the petrol is washed with sodium hypochlorite, for the elimination of sulphur compounds. In connection with this plant you will see a rotary converter house, for transforming the

3300 volt alternating current to a 220 volt direct current. This is required for the electrolytic house, where, in two hours, ten tons of salt can be converted into sodium hypochlorite.

Rectification.

The final plant to be visited is that known as the benzine rectification plant, where the crude spirit is fractionated into petrol and kerosene, both of which are treated in the manner already explained. The petrol is now conveyed either to the docks, for shipment, or to our own railway-loading platform on the siding, eventually finding its way to the well-known roadside pump bearing the letters "B.P.," which being interpreted mean: "Best possible British petrol marketed by the all-British Petroleum Company for the British public."

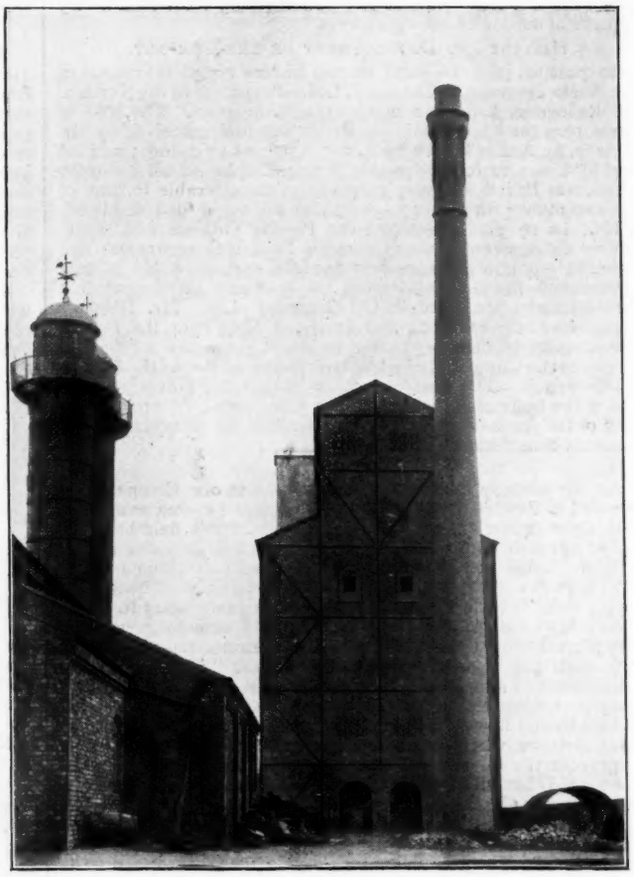
WOODALL-DUCKHAM VERTICALS AT HINCKLEY.

The new carbonizing plant recently installed at the gas-works of the Hinckley Urban District Council consists of an installation of Woodall-Duckham vertical retorts. The Council, after inspecting a number of vertical-retort plants, on the advice of their Engineer, Mr. F. Lee, placed their order with the Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., in July, 1921. Nearly twelve months elapsed before the Board of Health gave their sanction to the carrying out of the work, which was not commenced on the site till July, 1922. Gas-making was started in September, 1923, since when the old coal-gas plant has been shut down.

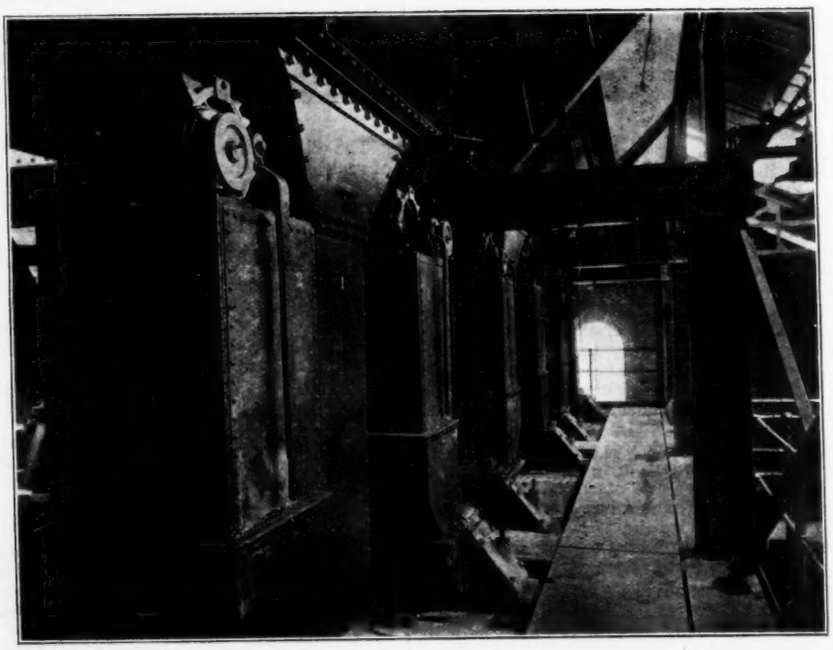
The plant comprises twelve continuous vertical retorts in three settings of four retorts, each setting having its own producer, regenerator, waste-gas flue, and damper. The coal is discharged direct from carts into a receiving hopper at ground-level, and passed through a four-roll coal breaker on to a gravity-bucket conveyor of 25 tons per hour capacity, which elevates the coal and discharges it into the overhead storage hoppers above the retort bench. The coal then passes into the retorts, where it is carbonized; and the gas evolved passes through the retort into suitable off-take pipes, whence, after purification, it eventually passes to the consumer. The rate of the descent of the coal is governed by the rate at which the coke is extracted at the bottom of the retort. Extraction is continuous, power being supplied by a 1½ H.P. steam engine (a stand-by engine is also provided); and arrangements are made whereby the speed can be regulated for each retort.

Under the coke extractors a storage hopper and water-sealed discharger are provided; the latter being opened by hand at two-hourly intervals. The coke for the producers is discharged into skips, which are pushed by hand to the hopper over the gravity-bucket conveyor, and fed directly on to this for elevation to the overhead coke-storage hoppers above the producers. The remaining coke is taken direct to the yard in skips. A belt-driven lift is provided to act as a stand-by to the conveyor, and also to take the workmen to the various stages of the plant.

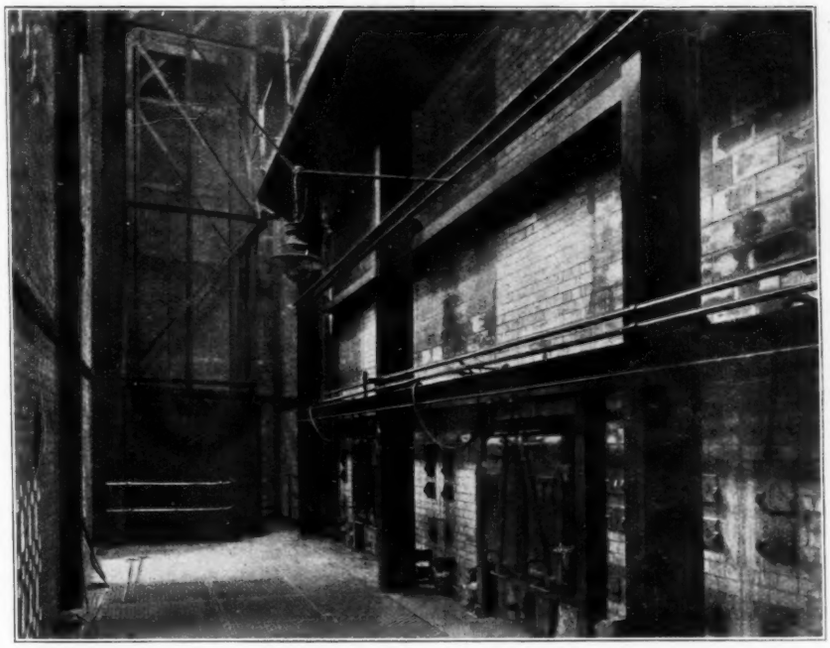
The hoppers provided over the retort bench for coal and coke contain 48 hours' supply; thus obviating the necessity for raising any coal or coke in the conveyor during the week-end, and also providing a still further safeguard to the conveyor and lift. The whole of the motive power for the coke extractor, coal breaker, and conveyor and lift, is steam from the works boilers; but all arrangements have been made



THE HINCKLEY VERTICAL RETORT-HOUSE.



AUXILIARY COAL-HOPPERS ABOVE RETORTS.



PRODUCER STAGE.

for installing a waste-heat boiler when necessary. By this arrangement a large portion of this steam, together with the other retort-house requirements, will be generated from the waste gases from the settings.

The plant, which will have an output of 900,000 c.ft. of 500 B.Th.U. gas per day, is equipped with all fittings for steaming, should it be required to produce gas of a lower calorific value.

REFRACTORY MATERIALS SECTION OF THE CERAMIC SOCIETY.

Autumn Meeting at Chester.

The Autumn Meeting of the Refractory Materials Section of the Ceramic Society was held in the Grosvenor Museum, Chester, on Oct. 4 and 5—Mr. J. Holland presiding over a large gathering of members from various parts of the country.

Drying Refractories.

Mr. W. J. Gardner read a paper by himself and Mr. J. Holland on "Improvements in Drying Refractories or other Goods." The goods are made to travel through a tunnel dryer by means of steel roller tracks; the heat being supplied either by a furnace or by hot gases from kilns or any other convenient source. A flue passes longitudinally below the drying chamber (or chambers), and at the far end communicates with lateral flues, one on each side of the chamber, leading back to the chimney stack over the front. A cooling chamber which forms a continuation of the drying chamber is cut off from the latter by a baffle or damper. A stove of two such chambers, 60 ft. long and 3 ft. wide, the cooling zone being a further 10 ft. long, is capable of drying 5000 silica bricks per shift of nine hours, at a temperature of about 100° C. at the centre of the stove above the bricks, and with only 4 cwt. of coal consumed. It is claimed that not only is much time saved, but a very much smaller ground area is required for a given output; that the conditions are improved for the employees; and that the better conditions and easier facilities produce a higher quality of goods.

Dr. J. W. Mellor's short paper on "The Zenith Temperature" was taken as read. It showed that, from certain physical data, with one or two not unreasonable assumptions, the maximum temperature attainable can be calculated to be somewhat lower than 4 billion degrees C. Mr. W. J. Rees, B.Sc., F.I.C., dealt with "Glasshouse Pots." The chief difficulties met with were briefly discussed, and also the means by which they may be overcome. On the second day, the first paper was by Mr. A. H. Middleton, entitled "Notes on the Proctor Dryer." The machine and its working were described, and some data given to show that bricks alone can be completely dried in twelve hours, and probably in eight hours. Advantages claimed are that the drying can be carried out much more quickly, and with less risk of cracking and setting-up drying strains; that (except where exhaust steam or some source of otherwise waste heat can be used) the Proctor dryer is economical as regards fuel; and that, as compared with hot-floor drying, the conditions in the moulding shop can be made much healthier and pleasanter for the workers.

Production of Industrial Gas—the Maclaurin Process.

Mr. R. Maclaurin contributed a paper on "New Methods of Producing Gas for Industrial Operations." In making gas for industrial purposes, three different chemical reactions are utilized: (*a*) The heating of bituminous coal to temperatures above 400° C. in the absence of oxygen, various gases being evolved; (*b*) the reaction of air with heated carbon (in large excess), producing a mixture of nitrogen, carbon monoxide, and a little carbon dioxide, as in the original Siemens producer gas; and (*c*) the reaction between steam and very hot carbon, resulting in the formation of carbon monoxide, some carbon dioxide, and hydrogen, as in water gas. In the Mond and Maclaurin producers a combination of these reactions is used to make gas. Good producer gas may contain from 29 to 33 p.ct. of carbon monoxide; the remainder being nitrogen, with some carbon dioxide. Such gas, when burning, might very easily have its flame put out in contact with large quantities of cold ware, and so is unsuitable for the ceramic industry. The introduction of steam with the air in producers largely overcomes the objections to the pure air producer, by avoiding clinkering difficulties, increasing the calorific value of the gas, and supplying hydrogen to it, so that the flame is not readily extinguished.

The great difficulty in carbonizing coal in externally heated retorts is of transferring the heat to the centre of the mass of coal; and this necessarily limits the width of all such retorts. By steaming the charge in vertical retorts, the calorific value of the resulting gas is lowered by the admixture of water gas, though that is no disadvantage for most heating operations, and the increased yield and greater fluidity of the oil is a very great advantage. The ammonia yield is also increased; but the coke yield is reduced, and its ash content increased. The author's hope of producing a smokeless fuel from coal was based on Percy's statement that coking coals, when heated slowly for a prolonged period, lost their power of coking.

The Maclaurin producer at Grangemouth is about 45 ft. high, and has a maximum width of 8 ft. It is built square, instead of circular, to allow of greater uniformity in the air distribution. The air blast is introduced about 12 ft. above the four discharging doors. The blast is distributed through a large number of narrow brick ports in the side walls, and also in a dividing wall which is carried across the plant to ensure greater uniformity in the distribution. The plant tapers upwards above these ports, until the opening is reduced to about 3½ ft. The brickwork stops here, and a cylindrical iron tank, 8 ft. wide and about 10 ft. high, completes the main part of the structure. The bottom of this tank is projected upwards towards the centre, so as to provide a well within which oil and water can collect. An inner cylinder, called the condenser, about 4 in. less in diameter than the outer one, is supported an inch above the bottom, so as to leave a free passage for the oil. On the condenser is fixed the charging bell and a small hopper capable of holding about a ton of coal.

At the bottom the coal rests on a cutter plate, which can be moved by a lever; and the escape of gas is stopped by a small water seal, which can be swung into place by another lever. The movements are very simple; and the arrangement allows the workman to see and control the discharge. The discharging doors are about 6 ft. from the ground, so that the coke or residue can be dropped into tubs or on to a conveyor. The plant, when

XUM

full, holds about 30 tons of fuel. Working is continuous after it has been started; about a ton of coal per hour being put in at the top, and the equivalent of coke or residue withdrawn at the bottom. To change-over from working for coke to working to complete gasification, the only alteration required is the adjustment of the valve controlling the air blast and the valve controlling the gas passing away. The control of these valves enables the operator to obtain a black smokeless fuel, a hard grey coke, or an ash residue.

Though continuous in working, the plant may be considered to be divided into a cooling zone, a combustion zone, an ammonia-making zone, a distillation zone, and a condensing zone. In the cooling, combustion, and distillation zones the three reactions previously alluded to take place. The cooling zone extends from the discharging doors upwards to the air ports; steam being introduced at the doors. The steam is superheated, and finally decomposed, by the hot fuel below the air ports. At and above the air ports, combustion takes place to produce a coke-air gas; while further decomposition of steam also occurs. The temperature and conditions immediately above the combustion zone are suitable for generating ammonia; and when working to exhaustion, much ammonia is produced in this zone.

Above this, where the temperature has dropped to about 500° C., is the distillation zone. Here the coal, having been slowly heated up for some hours, will have lost most of the oily material; and, as the latter has been in contact with neither very hot carbon nor very hot retort walls, little decomposition has taken place. The oils and gases being driven off very slowly, there is practically no rupturing of the cellular structure of the coal. It is known that the intumescing material in the coal begins to soften and break up after the non-coking oils have been driven off; so these lighter oils are nearly all away in the Maclaurin plant before the material which binds the coal into coke begins to act. Hence the coal, instead of completely softening, losing its shape, and binding together, only very gradually becomes sufficiently plastic to take the impress of the surrounding pieces of coal. From coals that would not by themselves form a coke in a coke-oven, good coke can be obtained in the Maclaurin plant, because large coal is used, the cellular fabric of which is not destroyed as it is by grinding for use in coke-ovens. The oily vapours are caught in the ascending stream of hot gases in the Maclaurin plant. Above the constriction the velocity and temperature decrease quickly, and condensation of oils and of water takes place; the liquids trickling down into the well of the condenser. Gas, oil, and water flow along the gas exit pipe (near the bottom of the outer cylinder) to the hydraulic main, coolers, and scrubbers, where the rest of the oil and the ammonia and the bulk of the water are condensed out. Only clean coal gas passes to the suction fan, which delivers it where required. When working for coke, the gas leaves the plant between 65° and 80° C.; and as the discharged coke is also cooled, the heat losses in the process are remarkably small. The heat necessary to maintain the temperature is supplied by the combustion of a small quantity of the carbon of the fuel; but the carbon monoxide formed is afterwards available in the gas produced.

The coke generally resembles in size and appearance the lumps of coal going into the plant. In non-coking and low-coking coals, a considerable quantity of the limy and pyritic matter breaks off and forms dust. The large coke obtained by screening often contains much less ash than might be expected. Stony matter can also be readily separated after carbonization. The fuel made can be varied according to the blast used; a black and easily ignited fuel, or a silvery grey furnace coke, being obtainable at will—both of them hard, and generally much harder than the original coal. The volatile matter in both is usually between 5 and 3 p.ct. The oil yields range from a very few gallons per ton, with strongly coking coals of low volatile content, to 30 or 40 gallons per ton with cannel coals; the average yield for bituminous coals lying between 14 and 20 gallons.

The crude oil is usually a thick brown liquid, with a setting point between 20° and 30° C. These oils are readily separable, without distillation, into four distinct portions: (1) An asphaltic portion, somewhat similar to bitumen or asphalt; (2) a more resinous portion, consisting largely of phenols of high boiling point, and worth 3s. 6d. to 4s. per gallon; (3) a portion consisting of the known phenols from carbolic to the xylenols, now worth 1s. 6d. to 2s. per gallon; (4) a neutral oil, rich in paraffin wax. The ammoniacal liquors are free from ferrocyanides and sulphocyanides, but contain polyhydric phenols, one of which gives a blue colour with iron, and another a quinone oxime, somewhat similar to resorcinol green, available as a green dye. The ammonia can be obtained as white sulphate by ordinary methods; the yield being 16 to 18 lbs., according to the nitrogen in the coal, and whether the plant is run for coke or for complete gasification.

Figures were given showing that the cost of gas is less when coal is gasified in Maclaurin producers than by any other process used on a large scale, and in most cases very much less. It is claimed that the gas from a Maclaurin producer working for coke meets the potters' requirements admirably, giving a reasonably long flame at a reasonably low price.

Mr. G. M. Gill expressed surprise that difficulties due to caking of the coal should not have arisen, but hoped Mr. Maclaurin would be encouraged to continue his work, as the results would be very valuable if the method proved capable of being carried on for a reasonably long period as advantageously as was claimed to have been done so far.

Sir W. J. Jones also thought Mr. Maclaurin ought to be encouraged, and suggested that, if the process substantiated what was claimed, it seemed to be very suitable for Canada, where the large supplies of bituminous coal in British Columbia, now of comparatively little use, could be converted into badly-needed heating fuel.

Salty Coal and Refractory Materials.

The next paper was on "The Effect of Salty Coal upon Refractory Materials," by Mr. L. M. Wilson, M.Sc. This embodied the results obtained by studying the effects of ammonium chloride upon refractory materials; the ammonium compound being found in coke-oven gas from salty coal. It was possible to remove all the iron from fireclay brick or silica brick samples by heating in contact with ammonium chloride; but in the case of the fireclay a temperature of 1100° C. maintained for 24 hours was necessary for the complete removal of the iron. An increasing amount of alumina is also removed from fireclay bricks, in the same way, as the temperature is increased. There is a critical temperature at about 900° C., where the chemical properties of burned fireclay seem to undergo a change, quite apart from the critical temperatures at which the physical properties of either raw or fired materials are known to alter. Below this critical temperature, very little alumina is removed, and above it much alumina. As regards resistance to salty coal, high-grade silica is superior to fireclay for the lining of coke ovens. Evidence was also obtained which seemed to show that interaction takes place between silica and alumina at temperatures well below the softening-point of either.

Carbonization of Clays.

The final paper was by Mr. Walter Smith, on "The Carbonization of Clays." By saturating clay at a certain stage of heating with hydrocarbon gases or volatile hydrocarbons under pressure, the carbon is deposited uniformly throughout the substance of the biscuit clay, which is then black to the smallest particles. Subsequent heating causes contraction of the clay; the carbon particles being greatly compressed. By firing under strongly oxidizing conditions, this black product is capable of being converted into a light-coloured substance of microscopically porous structure; the heat-resisting and refractory properties being highly increased. If the clay be properly carbonized, these impurities will be considerably reduced. For industrial purposes, the author suggested the term "carbonite" for the black carbonized clay. The hardness and toughness of this product adapt it for abrasives, for mixing with cement, for road making, &c. It is also very refractory to heat when air is excluded. Black carbonized clay is impervious to weather or atmospheric action. The white carbonized clay or "carbo-calcined clay" in general refuses to melt at anything near the same temperature as that of the original material. The durability of bricks of the carbonized product has often been found to be greater than that of articles produced from the natural clay.

Sand, ganister, or other siliceous material, when heated in the presence of hydrocarbon gases, become opaque or milky white, instead of transparent or semi-transparent, as after firing in an open flame. Increased angularity and sharpness of the particles of ganister, siliceous clays, or silica, also results from the hydrocarbon treatment. The binding of carbonized clay is accomplished by pressure, just as with magnesite. Artificial binders should be used sparingly; and in the case of carbo-calcined materials, the binder should preferably be of the same composition as the original clay. Carbonization increases the normal formation of sillimanite in alumino-silicates, as shown in a specimen of Ayrshire bauxitic clay, and other clays. Bricks made of carbonized clay may be said to possess refractoriness and hardness, with very slight contraction or expansion if fired at a higher temperature than that to which they are to be exposed in use.

The Hele-Shaw Filter.—An interesting suggestion as to the action of the Hele-Shaw streamline filter (see "Journal," Vol. CLXIII., pp. 307, 680) has been put forward by Mr. G. E. Watts, of Cambridge, who criticizes the use of the term "filtered" in this connection. He maintains that to say that some of the solution has been filtered off is to make the entirely unjustifiable assumption that the molecules or ions of the solute are larger than those of water. The explanation provided by Prof. Sir J. J. Thomson regarding the action of semi-permeable membranes is submitted as being applicable to the Hele-Shaw process. Briefly, this is as follows: The tendency of a liquid is always to diminish its surface energy wherever possible. In most cases, the effect of increasing the concentration of a solution is to diminish the surface tension with a solid surface. Suppose a solution to be flowing through a narrow channel. In order to diminish its surface energy, the solute will tend to accumulate at the sides; and if the channel is long compared with its diameter, the solute will be partially or completely removed from the emerging liquid. If this explanation is the correct one, it is difficult to account for the different degree of separation effected by the regulation of the distance between the paper sheets which form the filter. Whether these are compressed highly or only loosely packed does not diminish or increase the amount of surface over which the solution passes. This suggested elucidation of the working of the filter, therefore, appears to be inadequate.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

VISIT TO BURNLEY.

AT THE BURNLEY MEETING OF THE MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Members of the Association visited the Lane Bridge Works of the Burnley Gas Department last Saturday week, about ninety being present. They were received at the General Offices by the Chairman (Alderman H. Emmott), Mr. J. P. Leather (Gas Engineer), Mr. J. H. Clegg (Deputy Gas Engineer and President of the Association), the Town Clerk, Major Ross, and Councillor T. Brown. The party were divided into three groups; the guides being the Gas Engineer, the Deputy Gas Engineer, and Messrs. Langstreth, Young, Pedder, Maudsley, Davis, and Munrow.

THE CORPORATION UNDERTAKING.

Though this is not the first gas-works erected in Burnley, a portion was built in 1823, when the Burnley Gas Light Company was established with a capital of £4500. This was the first attempt to furnish the town with gas; and the supply commenced in 1824. The growth of the undertaking is illustrated by the following figures of the output of gas:

1863—	60,000,000	c.ft.
1889—	322,000,000	,,
1909—	672,000,000	,,
1923—	825,000,000	,,

In 1854 the local authority acquired the undertaking from the Company at a cost of £30,183. The present Engineer (Mr. J. P. Leather, F.C.S.) was appointed in 1889 to succeed his father (Mr. S. P. Leather, A.M.Inst.C.E.), who was appointed Engineer in 1863. These two gentlemen have been responsible for practically the whole of the plant in use at the present time. Since 1864 the undertaking has handed over to the borough fund for the relief of the rates £306,426. Last year there was a gross profit of £45,486, and a net profit of £28,978. The present price of gas is 8½d. per therm, with reductions to 6½d. per therm for quantities and to power users, all less 5 p.ct. The declared calcrific value is 475 B.Th.U.; the average quality supplied during the past year having been 484 B.Th.U.

DESCRIPTION OF THE WORKS.

Coal is delivered by barge containing twelve boxes (each box with 3 tons of coal), and emptied by means of an electric crane.

Vertical Plant.—Crane and ferro-concrete hopper and shoot were erected in 1921, and the coal store in 1908, with vertical retort-house, by direct labour. The coal is crushed before being placed into store. There are nine settings of Woodall-Duckham vertical retorts—six settings of original oval type (nominal capacity 2½ tons per day each), and three settings of slot retorts (nominal capacity originally 5 tons). These were, however, shortened 18 in. to obtain more head room. The installation is now working its fourteenth year.

Inclined Retort-House.—The retort-house and coal store were erected in 1891. The coal store, retort-house, and the whole of the installation with the exception of the steel work, were built by gas-works labour. Owing to the close proximity of the local collieries, the coal store is designed to hold only ten days' supply. There are 26 settings, in two benches of thirteen, face to face, with one charging stage between; six retorts per setting, 15 ft. long, in two sections, 24½ in. by 16 in. in section; ascension pipes at the charging side; capacity of the installation 2 million c.ft. per day.

Carburetted Water-Gas Plant.—This is of the Economical Gas Construction Company's make; and there are two plants (erected in 1901), each of 750,000 c.ft. per day capacity. The actual make last winter was over 1,000,000 c.ft. per day. The quantity of oil used is 2 gallons per 1000 c.ft., and the total coke to generator, 38 lbs. per 1000 c.ft. The blower is driven by a Tangye steam engine in duplicate. Two 28 ft. by 7 ft. 6 in. boilers provide steam to the retort-houses also. A waste-heat boiler is to be connected to the main flue to chimney, to generate 4400 lbs. of steam per hour with 100° superheat.

Condensers, &c.—There are six Clapham water-tube condensers, one Livesey washer, two large tower scrubbers, and a Holmes rotary washer-scrubber. The capacity is 4,000,000 c.ft. per day.

Exhausters.—This plant comprises a Bryan Donkin duplicate set of two-bladed exhausters, 100,000 c.ft. capacity each per hour, and a Waller duplicate set, each 50,000 c.ft. per hour. The water-gas is introduced into the coal-gas main at the inlet to the exhausters, after being measured in the crude by a station meter.

Purifiers.—The gas divides into two streams; one portion passing through two water-sealed boxes 35 ft. square. The other stream passes through four 24 ft. by 18 ft. boxes—old boxes converted to rubber sealed. The eight small boxes are by-passed, owing to shallowness of seal. The streams then combine, and pass through four 35 ft. square boxes, water sealed, thence through meters to the Stoneyholme station.

Tar Distillation Plant.—This is of a nominal capacity of 20 tons per day; actual, 25 tons. It is of Hird's patent continuous type. The department sell pitch, creosote, naphtha, and crude naphthalene. The oils for export are sent by compressed air underground direct to the station.

Sulphate Plant.—The capacity of this is 2 tons per day; average quality sulphate, 24¾ to 25 p.ct. ammonia. A Claus kiln is attached to this plant.

Workshops.—There are mechanics', blacksmiths', joiners', wheelwrights', painters', and electricians' shops; and the department do all their own bricklaying and retort setting.

Stoneyholme.—At the Stoneyholme station are four holders, with a total capacity of 2½ millions; a 30-in. Braddock governor; a 30-in. Peebles governor; and two 50,000 c.ft. per hour and one 18,000 c.ft. per hour Bryan Donkin compressors, driven by National gas-engines, for boosting and high-pressure work.

Distribution Shops.—These are at Lane Bridge. There are a meter repairing shop (where the department repair all their own meters, make their street lamps, and do all sheet-metal work), and stove and griller shops for overhauling all types of gas apparatus.

Central Showroom.—This is at No. 66, St. James Street, where there is a fairly complete display of all gas-consuming apparatus. The Department hope to exhibit a gas-heated Spencer-Bonecourt boiler for the generation of steam.

Laboratory.—The Borough Analyst's laboratory is attached to the gas-works, and is partially maintained by the department. It is consequently better equipped than is customary on a works of this size.

Old Hall Site.—This is a site for new works, 24 acres in extent, on which the department are at present engaged in the erection of a new gasholder of 3 million c.ft. capacity. The tank is finished, and is constructed of mass concrete. It is 161 ft. in diameter by 35 ft. 1½ in. to the top of the rest blocks. The holder will be in five lifts, and when fully inflated will be 170 ft. high. Plans were exhibited in the offices. The tank is now completed; and the work of erecting the inner lift has been commenced.

The members were conveyed by charabanc to the Old Hall site. Photographs of the party were taken at the works, and again at the holder station. Subsequently, high tea was provided by the Gas Committee at the Empress Hotel.

Mr. W. H. HEALD (Preston) moved a vote of thanks to the Chairman and his colleagues for their hospitality, and said that Burnley Gas Committee in the next three years would have spent almost half-a-million on their new works. This fact alone proved that they were a progressive body of men. The price of gas at 8½d. per therm, with reductions to 6½d., less 5 p.ct. discount, and facing a big capital expenditure, was something which only capable men would tackle and be prepared to take the full responsibility for. The name of Leather had been associated with the Burnley gas undertaking since the year 1863. The present Mr. Leather was a gentleman who always proceeded with his work on scientific lines, in addition to being very practical. All his records were of the highest. He (Mr. Heald) hoped that Mr. Leather would see the completion of the full scheme that had been laid out for the development of the Old Hall Site, bringing, he understood, the daily capacity to 8 million c.ft.

Mr. H. E. STONE (Birkenhead) seconded, and remarked that Burnley were the pioneers of vertical retorts, which in itself spoke volumes for them. The visit had proved very instructive; and they were very grateful to the Engineer and his Committee for the privileges extended to them.

The PRESIDENT, in passing on the vote, conveyed to the Gas Committee and the Engineer his personal thanks for the manner in which they received his suggestion that the Association should visit Burnley. Everything had been done to make the visit one to be remembered. He was very proud of the Burnley undertaking.

Alderman EMMOTT (the Chairman of the Committee), in reply, expressed his appreciation of the remarks. It was with pleasure that they had welcomed the Association to Burnley; and he hoped that the visit would be helpful to all. He considered their works were very well managed. The position of the undertaking in pre-war days was always very satisfactory; it being among the lowest on the list for gas charges, notwithstanding that some of the plant was getting out of date, and had worked at full pressure for some time. The undertaking dated back to 1823; and now they had decided to bring their works thoroughly up to date. A new site had been obtained, which was very well placed; and when the scheme they had sketched out had been actually completed, he thought it would be a works that all could be proud of. They were well pleased with their Engineer and his staff, and had confidence that the work would be carried out with complete success, and would be to the advantage of Burnley.

Mr. J. P. LEATHER said he was glad to hear that the visit had been so interesting. The works were very old, and had been built-up piecemeal. He was sure the new scheme, when completed, would be a decided advantage to Burnley. When they first put up inclines, there were no installations working in this country, except in experimental stages. He could also say the same with regard to vertical installations. Of course, this meant that they were taking a great responsibility, as was ever the case with pioneers. The price of gas pre-war was rather less than 2s. per 1000 c.ft., and gas for motive power was 1s. 5d., less 5 p.ct. discount. They were hoping they might even get back to those figures again—in any case, they ought not to despair of it. New plants, better service, and free advice on the use of gas was the policy of the day. He expressed hope for the future of the gas industry.

Mr. J. H. CLEGG then delivered his

PRESIDENTIAL ADDRESS.

Unlike most Associations, the President of which usually delivers his address at the time he takes the Chair, our Association decrees that this function must take place in October, six months after the President has entered into office. This rather alters the tenor of the address from an appreciation of the honour of the election to such office, and a statement of the ideals and objects he wishes to obtain during his session, to a kind of discursive paper on topics of general interest to the profession. Customs are often maintained which have lost their original useful intention; and if one is not careful, slavish adherence to custom stifles originality. Originality is a great thing, in my opinion; but the dividing line between originality and lack of system is rather fine. The main topic of interest at the present moment to juniors in the gas profession is the education of the gas engineer; but this afternoon I wish to speak of the education of the layman to aid the development of the gas industry. At the present time the whole country is interested to some extent in gas manufacture, and more so in the uses of gas. I make no apology for the reiteration of the fact that the gas industry benefits the national welfare from a health point of view, as well as from a financial one.

SMOKE ABATEMENT.

It is becoming imperative that the State, and all municipalities—in fact, every intelligent individual—should take a lively and practical interest in the prevention of the pollution of the atmosphere in our towns and cities. The extent of depredation caused by this evil has been broadcasted frequently of late, but largely at the instigation of bodies and individuals whom the general public might think are not disinterested. The present apathy, however, must not be allowed to exist, and a strenuous campaign should be made from official quarters. It does look ridiculous for the average inhabitant of a town to live in such an atmosphere as ours for 51 weeks per annum, and then depart to the country or seaside for a week for the purpose of cleansing the lungs. Comparisons of the purity of the air in different localities are given to us as an inducement to patronize the healthful places; but, after all, we—not Nature—are almost entirely to blame for the impurity of the atmosphere. So long as we are clustered together, it is impossible to have a perfectly pure atmosphere; but we have scope to improve it 90 p.ct. This improvement can be obtained by the abolition of the use of raw coal; and if the problem were now tackled seriously, it would not, I think, be too hazardous to state that the desired effect could be obtained in thirty years. Lancashire, the Midlands, the West Riding, and the North East Coast, being the greatest sufferers, will have to take the lead. The colliery proprietors and the miners have no encouragement to study the conservation of coal; output in their case means prosperity. The men to take the lead are the fuel experts, backed by the State, and municipalities giving assistance from their health, education, and architectural departments.

ALTERNATIVE FUELS.

What is to be the alternative to the use of raw coal? At the present date we have as substitutes coke, fuel oil, refined oils, coal gas, spirits, and electricity. The cost per therm of each fuel ascends in the order given. Now to consider each fuel individually. I am ignoring the possibilities of producer, suction, and water gas, as these come under the heading of coke. Acetylene I regard as impracticable.

Coke can be dispensed with for domestic purposes. Fuel oil is a cheap working fuel for power purposes; but after taking all costs into consideration, the advantage of its use is *nil*. By all means let us use our home production of such oil; but why import it? I must admit at the present time that the gas industry is a very large consumer of such oil; but this may not be necessary in the future.

Coal gas is the next in cost per therm. To the layman such a statement is misleading. The value of gas lies in the ultimate cost of its use. With gas 85 p.ct. of the heat can be used; with coal 30 p.ct. is a common figure, and unless coke is gasified the efficiency is little higher. Further, the fuel is conveyed automatically to the consumer; and the cost of transmission to the user is, I think, cheaper than with solid fuel or electricity. From the point of view of economy, at the present time gas has the advantage over electricity or oil for any purpose.

Spirit is almost necessary for portable power engines. Attempts have been made to convert the user to the employment of a home-produced spirit obtained as a bye-product from the distillation of coal. This field should certainly be pursued. If all the raw coal were properly used, sufficient spirit would be forthcoming. For stationary power, this fuel should be ruled out, from a financial point of view.

Electricity has its excellent uses; and if, from an aesthetic point of view, the user is prepared to sacrifice economy, allow him to do so, but not employ electricity produced by the consumption of raw coal. The best way to produce electricity from coal, to save the valuable bye-products and to prevent further emission of smoke, is to generate it by means of coal gas. Here is the finest and most convenient means of converting energy; for, after all, electricity as used at present is not in itself a fuel, but a converted form of it. Great strides have been made in the development of the gas-engine in late years; and I maintain that gaseous power, in spite of the prejudiced attitude of some electrical engineers, is a fuel to be considered at no distant date. The chief objection of the electrical engineer from past experience in the use of gaseous energy was with regard to obtaining sufficiently large units of power, and the difficulties of synchronization in the running of machines.

I should like to recommend to your notice a paper on "The Installation and Working of Large Horizontal Gas-Engines," read by Mr. Henry Pilling, before the Cleveland Institution of Engineers in 1919. Engines over 3000 H.P. are now successfully generating current with a consumption of 10,000 B.Th.U. per B.H.P.-hour. A modern condensing steam engine requires, at the present day, approximately 23,000 B.Th.U. per B.H.P.-hour. A modern steam turbine needs 15,000 B.Th.U. per B.H.P.-hour. Further, the gas-engine requires less cooling water than is needed in the other cases for condensing purposes. After considering these facts, why should we not concentrate in obtaining the field for gas as fuel for the prime mover? From figures which I have had occasion recently to consider in comparison with steam obtained by raw coal, a price of 4½d. per therm at the consumer's point should be our maximum price in this district at the present time. This is not impossible. Some fortunate undertakings could sell at that price now; and, further, in most cases the allocation of on-cost charges to the price in the holder is worthy of debate. There is room, and plenty, for both gas and electricity, if solid fuel is ousted; and amicable relations between engineers of the two professions should be fostered. If some person can invent a gas-power turbine or an engine giving a direct rotary motion, instead of a reciprocating one, he will be the means of finally conquering this obstacle in the mind of the electrical engineer.

STEAM.

The production of steam is necessary. A certain cotton mill in Burnley for some time has been running entirely from power generated from a gas-engine. At the same time, the steam required for preparation purposes is generated by the exhaust gases from the engine. There is no reason why gas power should not be utilized universally, either from one large unit or direct driving by electricity generated by gas. At present in Burnley, where the installation of a gas-driven dynamo is effected, and no extra labour is necessary to supervise it, the cost of current so produced is lower than the power rate alone charged by the electricity department. The generation of steam by coal gas is now an accomplished fact. I had hoped to have here for your inspection this afternoon a steam boiler heated by coal gas. This field will develop when the charge for gas is sufficiently low.

COKE-OVEN GAS.

Surprising as it may seem, there is still a large number of beehive coke-ovens in use in this country. The percentage is low; but why the valuable bye-products and the coal gas produced should be allowed to be wasted, is difficult to understand. I am informed that certain users have a preference for beehive coke; but the great proportion of recovery coke used shows that beehive quality is not necessary. As an adjunct to the town's supply, coke-oven gas is very useful; but considering the financial benefit of recovery plant, the income from the gas should not be regarded as an important source of revenue by the colliery proprietors.

STIMULATING SALES.

We know full well that, to obtain the universal use of refined fuel, cheapness is essential, and that the greater the use of this fuel the cheaper will be the cost of production. Thus one thing is necessary to the other. We must still endeavour to reduce the cost of production; but at the same time we must continue to stimulate the sales until the reduced cost produces by itself the required effect. The gas industry is in this direction making great efforts through the "B.C.G.A.," and by local organizations and showrooms. As yet, however, few municipal undertakings have well-equipped sales organizations and attractive showrooms for the display of gas-consuming apparatus. Gas companies are far more enterprising and up-to-date in this direction. It is lamentable that some local authorities should be so lacking in vision as to regard such premises and organizations as extravagant. Gas companies regard them as a means of furthering the prosperity of their undertakings. Local authorities have not only this point of view to consider, but a far wider duty—that is, to cultivate the public taste to the use of apparatus which will help to attain the wished-for purity of atmosphere and the prevention of waste. When the desired reduction of cost is secured, legislation should be introduced to prevent the use of raw coal. The nation must be prepared and educated, however, before such action can be taken.

HOW FURTHER TO EFFECT THE PREPARATION.

The propaganda work at present being carried on is good, but not sufficiently exhaustive; being almost wholly organized by the gas industry. This is not enough. Begin with the child. Here is where the education authorities can assist. Introduce into the curricula of the schools the evils, from all points of view, of the use of raw fuel. Inculcate into the young mind the suggestion that the house coal fire should be dispensed with. Accustom the child to the use of the gas-fire, and the sentiment of the adult for the use of the domestic coal fire will disappear.

Here is where the State, municipal authority, and architect come in. Instead of a select commission recommending the use of coke, gas, or electricity in the State-assisted housing schemes, the stipulation that this apparatus should be installed should be made. The backing of the State is absolutely necessary, for vested interests often prevent the whole-hearted action of individuals. The use of the coal-heated oven is gradually disappearing; but as for the gas-fire, the Northern Counties are the slowest to adopt its use. When the northern sentiment for the coal fire is overcome, and the cost of gas sufficiently reduced, there is nothing to prevent the absolute stoppage of the use of raw coal. Continual persistence will obtain the desired end.

CONCLUSION.

To sum up, my address this afternoon is an exhortation to the Juniors to concentrate on the displacement of raw fuel for any purpose where the recovery of bye-products is not effected, to make it his main object throughout his daily work to endeavour to induce all with whom he comes in contact to assist in remedying this great evil. Concentration of effort and determination will achieve much; and the junior will have the satisfaction of knowing that, while furthering the prosperity of the undertaking which he serves and the gas industry as a whole, he is doing a valuable work to benefit his country and fellow men.

Mr. J. Alsop (Bolton) moved a vote of thanks to the President, saying that all would concur in the sentiments expressed in the address. He wished the President a successful year of office. The syllabus this year was equal to any they had had for some years.

A number of new members were received.

The annual balance-sheet issued to the members showed a credit balance of £12 3s. 2d.

SCOTTISH JUNIOR GAS ASSOCIATION.

Western District Inaugurates New Session.

The Opening Meeting of the nineteenth session of the Scottish Junior Gas Association (Western District) was held on Saturday evening, in the Royal Technical College, Glasgow. Mr. W. J. Lennox (Falkirk), the retiring President, occupied the chair at the outset, and was accompanied by Mr. Andrew Walker (Kilbarchan), the new President, and Mr. John Murray (Glasgow), Hon. Secretary and Treasurer.

In the course of the afternoon, a number of the members paid an official visit to the Housing and Health Exhibition in the Kelvin Hall. The exhibition was strong in its gas features; and the visit proved highly educative to those participating.

SALESMEN'S CIRCLE.

Mr. John M'Isaac (Glasgow), the Vice-President, reported, at the outset of the proceedings, on a conference he had attended under the auspices of the British Commercial Gas Association, where special attention had been paid to the idea of developing Salesmen's Circles.

Arising out of this matter, a communication was read from Mr. David Fulton (Secretary of the North British Association of Gas Managers) indicating that the Council had given consideration to a proposal to organize in Scotland a Salesmen's Circle. The idea was to regard a Salesmen's Circle in Scotland as an integral part of the activities of the North British Association of Gas Managers, and the Council of that body felt the work could more readily be done by the Scottish Junior Gas Association.

Mr. James Cubie (Glasgow) said he did not appreciate the way in which this question of a Salesmen's Circle had been sprung upon the members. Mr. M'Isaac, they would have noticed, had attended a conference under the auspices of the "B.C.G.A."; but it was quite evident, from the report he had submitted, that the whole object of the conference had been to keep the idea of a Salesmen's Circle in the foreground. Speaking for himself, he (Mr. Cubie) did not want to surrender the status of the Scottish Junior Gas Association; and he thought that, before they committed themselves one way or the other, they would be wise to consult the views of the members themselves. If what was proposed was developed in the way intended, the tendency would be to merge the Scottish Junior Gas Association into a Salesmen's Circle. Whatever happened, he was keen to preserve the identity of the Scottish Junior Gas Association. ["Hear, hear."]

A brisk discussion followed, which was taken part in by Messrs. Frazer, M'Isaac, Cubie, and the Chairman. Eventually it was decided to place the matter of the proposed formation of a Salesmen's Circle on the agenda for next meeting, and to invite the considered opinion of all the members. It was hoped by next meeting to be in a position to supply members of the Association with the fullest details regarding the scope, function, and possibilities of a Salesmen's Circle.

THE NEW PRESIDENT.

The Chairman thereafter introduced to the meeting the new President—Mr. Andrew Walker, of Kilbarchan. Mr. Walker, he said, had been a faithful and diligent member of the Council for quite a number of years; and he believed he had the qualifications necessary for a good and successful President. Personally, he had to thank the members for the kindness and consideration they had shown to him (Mr. Lennox) during his tenure of office. He hoped the meetings would continue to be well attended, though he did have the feeling that the turn-out might have been even better that night. They must get the enthusiasm of the young men in the industry, if the work of the Association was to forge ahead.

Mr. Walker thereafter delivered his address, for which he was cordially thanked at the close of the meeting.

EXPERIENCES ON A SMALL GAS-WORKS.

I do not know if it is the practice in all small works, but the plant at Kilbarchan seems to have been bought second-hand from various places. For instance, the condensers came from Barrhead, the exhauster and purifiers from Renfrew, and the station meter and governor from Motherwell. The only piece of plant that is new, so far as I know, is the holder. But if those responsible for installing the plant erred, they at least erred on the side of generosity, for everything is of ample capacity.

The retort bench comprises one oven of two retorts, one of four, and one of five. The two retorts are direct fired, and the four and five are on the generator principle. I have only had occasion to rebuild one oven, that containing five retorts. I built it with silica segmental retorts (85 p.ct. silica); and these have given entire satisfaction. They were built in the summer of 1921, and put into operation in September of that year, so that they are now in their third winter. They are as sound and firm as in the first week.

EXPERIENCES WITH AMERICAN COAL.

During the coal strike of 1921, Kilbarchan, like many other places, had to procure supplies of American coal. When it arrived, I left the stoker to make the best of it; and next morning I found the holder almost full. On the following morning, however, all the ascension pipes were choked solid, and the hydraulic main was pitched from end to end. The deposit from the pipes looked like lampblack, interspersed with fine particles of coal dust; and the pitchy substance at the bottom of the dip pipes was hard to remove. By constant application the pipes were cleared, only to become choked again in about eight hours, when the performance had to be repeated. This was very annoying; but I noticed that the trouble always started in a certain pipe, and that before it was cleared the others were choked. The lids of the bridge pipes were taken off, and the seals dipped. It was then found that the seal on this pipe was ¼ in. less than on the others. We disconnected the bridge pipe, cut a piece of light sheet iron, and bent it to the circle of the pipe. It was left with sufficient spring to allow it to expand against the inside of the pipe, two short legs were riveted on to it, and it was pushed down till the legs rested on the bottom of the main, with the iron fully ¼ in. below the bottom of the dip pipe. The bridge pipe was connected up; and from that moment our anxieties with American coal ceased.

I was sceptical at first as to this method of deepening the seal; but it was so successful that I took the opportunity, on the oven of five being rebuilt, to dip all the seals. Three other pipes were found to be lightly sealed, and were treated in the same manner, so that now there is no danger of one retort being pulled while another is under a slight pressure.

EXHAUSTERS AND GOVERNORS.

The exhauster is a Laidlaw three-bladed one, and was fitted with a compensator which actuated a 3-in. by-pass flap valve. There is also an automatic by-pass flap valve on the 8-in. main pipe. Though the exhauster has a capacity of 10,000 c ft. per hour, I found it running at the rate of 180 r.p.m. for a make of 2000 c.ft. On taking out the flap of the automatic by-pass, I found it coated with thick tar and naphthalene deposits, which kept it off its face and allowed the gas to circulate. The valve was thoroughly cleaned, and was then capable of passing 2000 c.ft. per hour at about 120 r.p.m. The compensator was in such a disreputable condition that I was afraid to do anything with it. A hydraulic regulator was ordered, and when it arrived we disconnected the compensator. For convenience in shifting, we endeavoured to remove the bell, but the crown parted company with the sides. Round the waterline it could be torn like a piece of brown paper.

In fitting the hydraulic regulator we took the connection for the equilibrium pipe off the end of the hydraulic main farthest from the exhauster, fitted-up 1¼-in. pipe with crosses at all angles, and union couplings in all stretches. This was done so that, if the pipe choked, it could be taken down, cleaned out, and replaced in a very short time; while the crosses act as inspection eyes. Thanks to the adequate size of the pipe, we had no trouble. At the same time new rollers were fitted on the blades of the exhausters, which further reduced the speed to about 90 r.p.m. This was still too fast. In the end plates of this exhauster there is a recess on the outlet side which is carried round to the inlet side and allows a very considerable amount of gas to circulate. The end plates were taken off, and the recess plugged up with a piece of wood. A strip of yellow pine was used; and the wood left about ¼ in. below the flush of the iron. A 2-in. by-pass from outlet to inlet pipes was fitted, with a stopcock on it, so that the amount of gas passing back could be controlled. The exhauster can now pass 2000 c.ft. per hour at 40 r.p.m.; and while not exactly a straight line, the pull is very much steadier. These little alterations may not seem much in themselves, but the effect was almost incredible.

BOILER PLANT.

There is a small Cornish boiler, 8 ft. by 4 ft. diameter; and with the exhauster running at 180 r.p.m. it required constant attention to keep up steam, and to keep the pressure steady was almost impossible. The boiler now requires very little attention; and the saving in fuel is considerable. While formerly fully 3 tons of coke were used per week, we can now manage with 30 cwt. of dross. Taking these at current prices—

Coke, 3 tons at 25s.	= £3 15 0
Dross, 1½ ,, at 12s.	= 0 18 0
Saving . . .	= £2 17 0 per week.

Taken over twelve months this works out to about 1½d. per 1000 c.ft. of gas made, not to speak of reduced wear and tear of exhauster and engine.

There are three purifiers, 12 ft. by 10 ft. by 3 ft.; and when I first saw them, they did not impress me favourably. All round the water line of two of the covers there were slates and bits of iron, with a bed of putty and a piece of wood wedging these from the side of the lutes. On inquiry I was told that these were leaks. We had the covers thoroughly scraped and cleaned, and then gave them a coat of bitumastic paint. A strip of iron 6 in. broad by $\frac{3}{16}$ in. thick was bolted firmly along the water line, on a bed of red-lead putty, and the whole was given a second coat of paint. This has proved very satisfactory.

PRESSURE CONSIDERATIONS.

The available pressure from the holder is 35-10ths, and as we have two laundries, both large consumers, we keep this pressure on the mains all day, so that the governor is only used for shutting-off the pressure at night. It is an 8 in. governor, with an 8-in. pipe to the street, where it is reduced to 4 in. You can understand that, with an 8-in. governor, the cone piece does not require to be much off its bed to allow sufficient gas through to maintain pressure on a 4-in. pipe. During the coal strike we were forced to shut-off the supply during certain hours; and this we did by loading the balance arm till the pressure was reduced to 10-10ths. Going into the governor house one day, when the stoker was putting on the pressure, I found him wrestling with the bell of the governor, and pressing his whole weight on it. The cone was removed, when it was found to be coated with tarry matter (probably the accumulation of years). This had become very hard, with a ridge near the bottom which caused the cone to jam. It was scraped and cleaned, smeared very lightly with vaseline, and replaced; since then it has given no trouble.

By constantly impressing on the men the necessity for cleanliness, they soon begin to see that work becomes easier. On a small works many liberties are permitted; but the one thing I do insist on is cleanliness. Slovenly habits are neither good for the work nor for the worker. I once read of a manufacturer whose employees were engaged on very delicate work. He conceived the idea of painting the tops of the benches white, and found that the efficiency rose 30 p.ct. Though perhaps not to the same extent, this holds good in a gas-works; and by providing congenial surroundings—in the shape of good light and a judicious use of whitewash and paint—the efficiency of a stoker is increased. He becomes more alive and alert; and the work benefits in consequence. I have always had sympathy for the man who has to work seven days a week. The continuity becomes monotonous. Two years ago I arranged to give one man a shift off every third Saturday during the summer months. We damp down from 6 a.m. till 10 a.m. and from 6 p.m. till 10 p.m., which allows one man off, and still does not leave the work too long without someone being in attendance. This relief is much appreciated; and the men work with greater zest during the week.

UNACCOUNTED-FOR GAS.

On taking over the management at Kilbarchan I found that the unaccounted-for gas was 20·14 p.ct. One way of reducing the percentage unaccounted-for is to increase the make. Where one has to undertake the duties of collector, there are exceptional opportunities of getting into touch with consumers; and the conversation was always turned to the advantages of cooking and heating by gas. There is no advertisement like a satisfied consumer, and no pains or expense were spared to this end. In a village like Kilbarchan each knows the other's business; and if anyone got a gas cooker or fire, the whole street soon knew about it, and of course, had to come in to see it. I was once asked to supply a cooker to a consumer who asked that it be fitted in an empty weaving shop, and that the ordinary meter be substituted by an automatic. The consumption here had been less than 2000 c.ft. per quarter. Judge of my surprise, when, a month after the cooker was installed, I was asked to empty the meter, and found that 10,000 c.ft. had been consumed. I mentioned to the lady of the house that she must be doing a lot of cooking; and got the reply that all the neighbours used it. When anyone asks for a cooker to be fitted in a weaving shop now, it is done at once; and in a short time there will be half-a-dozen of these little communal kitchens in existence.

HIRE AND SALE OF APPLIANCES.

Cookers are supplied on hire and fitted free; gas-fires and other appliances are sold outright and fitted free. No hard-and-fast terms of payment are made, but any conditions that will suit the consumer suit me. Gas irons, fires, and one gas boiler have been sold and paid for by the rebate from automatic meters. These free and easy methods could not be adopted in a large undertaking; but where everything is under the one hand it works all right, the consumption goes up, and I find that a confidence is established which cannot be reckoned in thousands of cubic feet.

Increased consumption certainly lowered the percentage of leakage; but something further had to be done to bring down the actual amount of gas unaccounted-for. Special attention was given to meters. Here again, the manager who has to undertake his own collection has splendid opportunities. On the first survey I was astonished at the number of small 1-light meters that were doing service. Indeed, there were very few meters larger than 2-light, no matter what duty they were performing. The stupid rule had been made and adhered to, that while small meters were hired, a consumer requiring a meter larger than a 5-light had to purchase it. Why penalize large consumers? And, when we are on the subject, why charge meter hires at all? In Kilbarchan we have eliminated meter hires, but we stipulate a minimum consumption of 1000 c.ft. per quarter. To revert to small meters, I made up my mind that these must be substituted by others of a larger capacity at the first opportunity. This was a job which could not be rushed, but had to be tackled diplomatically, so that suspicion was not raised in the minds of consumers. When a larger meter is proposed, the first question asked is, "Will it increase my gas bill?" It invariably does, but it only means that the gas company are being paid for the actual amount of gas consumed. I never considered it served any useful purpose to say this, but I bided my time; and when a complaint came in, the blame was always laid on the meter, till, on one pretext or another, all these small meters have been replaced. No meters less than 3-light are now purchased. The results have fully justified this policy, because, though the gas made has increased from 9 663,500 to 12,412,700 c.ft., the amount of gas unaccounted-for has been reduced from 1,945,500 to 1,055,000 c.ft.—from 20·14 to 8·45 p.ct.

THE METER INSPECTOR.

We who are more closely connected with the manufacturing side of the gas industry are perhaps inclined to look on the meter inspector simply as a meter inspector; but if he studies his consumers, carefully watches their consumption, and keeps a sharp eye on the meters, he will be a most valuable servant and save his undertaking many pounds. Every meter inspector ought to be a potential salesman, able to give some advice on all gas-appliances. He is in constant touch with the consumers. If he is tactful, courteous, and obliging, a spirit of confidence is fostered that will benefit not only his own undertaking but the whole industry.

The cry of bad gas is as prevalent in Kilbarchan as anywhere, but it is a term I never admit. Bad light I can understand; but bad light can be had with any quality of gas, just as good light can be had with almost any quality of gas. I have often wondered why this cry of bad gas has become so universal; and it seems to me that consumers have, quite unconsciously, come to look for a higher standard of illumination. What was good enough some years ago will not be tolerated now. Unfortunately, they have not yet realized that to get this higher standard they must use up-to-date and efficient burners. Again unfortunately, any piece of brass with a mantle nozzle is regarded as a burner which should give a good light. When it does not, then it is "bad gas." Satisfaction will only be given when each undertaking instl-

tutes a maintenance department. My saying this may seem contradictory, since we have not such a department in Kilbarchan; but we intend to consider a scheme, and hope to have it in operation before very long. There are two plumbers in the village; and, like most others, they have sold any kind of cheap rubbish. I convinced them, however, that since the Gas Company was their best customer, it would be to our mutual advantage if only the best fittings were stocked. I am pleased to say that I have so far gained their confidence that when they have any particular job on hand they consult me first.

THE EDUCATION OF THE CONSUMER.

The education of the gas consumer is very necessary; and equally essential is the education of those responsible for the piping of houses. I read over the schedule of the plumbing and gasfitting work of a house erected in our district not long ago. It was an up-to-date house, with all the latest fittings, but with ¼-in. compo tube to the gas-brackets. This ¼ in. compo tube is an abomination; and if it were in my power I would put down its manufacture. I got into touch with the responsible person, pointed out that ¼-in. tube would not be tolerated in any circumstances, and unless I was satisfied that it would not be used no connection would be given.

Owing to increased make of gas a strain was put on the mains, and constant complaints came in from one district. Our area of supply is a scattered one—in fact, the village may be said to consist of one long street. For a make of 12 millions there are 4½ miles of mains, with another three-quarters of a mile of private main. From the gas-works a 4-in. main extends eastwards to Millikenpark Station, a distance of almost a mile, and westwards there is a 4-in. main on one side of the street and a 3-in. main on the other to the Cross, a distance of three-quarters of a mile. These mains join at the Cross, and continue northwards as a 3-in. main for another half-mile. It was this district north of the Cross that gave all the trouble; and on taking records with a pressure recorder I found that, while we started with an initial pressure of 35·10ths (full holder pressure), this was gradually reduced to 25·10ths at the Cross, and to 15·10ths at the extreme end of the main. To overcome this, several schemes were considered; and finally it was decided to isolate the 3-in. main as far as the Cross, instal a booster at the works, and use this pipe as a high-pressure main.

BOOSTING PLANT.

The booster is a small Bryan-Donkin exhauster direct coupled to a gas-engine. It has a capacity of 10,000 c.ft. per hour at 15-in. water gauge, and is fitted with an excess-pressure valve and a loaded by-pass valve. The former can be loaded to any pressure desired up to 15 in., and the loaded by-pass valve acts automatically in the event of the engine stopping. Altogether it is a fine little plant; and once started requires little attention. Three Peebles mercury governors were installed on the mains, one on the supply going eastwards to Millikenpark, one on the supply westwards to the Cross, and one at the Cross, governing-down from the high-pressure main. The 3-in. pipe was the original main, and each length of pipe had two "eyes" cast on it. These eyes were closed with a thin film of metal, which apparently had to be chipped out, the service pipe inserted, and run in with lead. This meant that the service pipe had to be connected wherever the eye happened to be. The result was that we found service pipes entering property at all kinds of inconceivable places, or turning and twisting all over the pavement. Some of the services were in a sad state; and in one instance there was no pipe left, the gas simply finding its way through a channel in the earth.

The pipe going eastwards is a 6-in. one for about 80 yards, and is then reduced to 4 in. On this 6 in. pipe we fitted the governor. We could not get the pipe bladdered off, and ultimately it was decided to reduce the pressure to 10-10ths, and cut out the pipe with the gas on. When this was done we found about ½ cwt. of lead. The man who had put in the pipe had made a bad joint. He had hammered the yarn inside the pipe, and then poured in a ladleful of lead. When this had disappeared, he had poured in another; and from all appearance he only stopped when he ran short of lead. Such an example of gross carelessness I hope never to meet again.

However, in time we got everything completed. The engine and booster were installed and connected to the main, and the governors were in position. The latter were loaded to give 4-in. outlet pressure; and we found that, so long as the pressure at the outlet of the booster was kept at 5 in., the west governor outlet pressure was 4 in., but that when the booster outlet was increased, the west governor outlet increased proportionately, while the east governor pressure remained steady at 4 in. As every care had been taken in connecting the governors, I felt sure nothing was wrong there, and that we should have to look elsewhere for the cause. The main was quartered off; and within 50 yards of the governor at the Cross we found a 2-in. pipe connecting the 4-in. and 3-in. mains. This was cut off, and the booster put on again, only to find that the same conditions obtained. The main was quartered off again, and another 2-in. pipe was found midway between the last one and the gas-works. Finally a third pipe was found not ten yards from where the 3-in. main itself crosses the road. I am glad to say, however, that the scheme has been an unqualified success. With 70-10ths pressure at the booster outlet, and with the governors loaded to 40-10ths, we can maintain a pressure of 35-10ths at the extreme end of the main. It has completely revolutionized our distribution system, and has placed us in a position to cope with any increased consumption likely within the next ten or twelve years.

Keeping records of carbonizing results is equally as important to a small works as to a large one; and to attain this I designed a carbonizing book, which also comprises a "coals bought" book, and a "residuals sold" book. I find it answers the purpose very well; and the fact of having the figures constantly before one is a fine incentive to do better.

From time to time we see in the Technical Press analyses of gas accounts of various undertakings. These are very helpful for comparison with one's own costs; but I have not yet seen the analysis of accounts for any works of the same size as the one I represent. I once offered to exchange balance-sheets with a neighbouring manager, but the suggestion was received with something more than suspicion. I do not know why. It was not made for any purpose other than to see that I was keeping my end up, and if not, to find the reason. In the hope, therefore, that it may prove interesting to all of you, and perhaps be a guide to someone now or in the future, I give you here one or two of our working costs and results.

Costs per Ton of Coal Carbonized.

	s.	d.
Coals	24	8
Residuals	18	4
Coals, *less* residuals	6	4
Wages	11	2·6
Upkeep and repairs	10	0·7
Carriage and cartage	3	1·1
Rates, taxes, and insurance	10	0·3
Salaries	6	8·4
Coke sold	6·86 cwt.	
Tar and liquor sold	58 gallons	

We have reached a period in our industry when we are accustoming ourselves to think and talk in therms, and thousands of cubic feet per ton have no real significance. Since we have no means of testing the calorific value of the Kilbarchan gas, I thought it better to give these figures on the basis of per ton of coal carbonized.

Time Saved by Gas-Fired Equipment.

The New England Smelting Works, at West Springfield (Mass.), have installed two 5-ton gas-fired metal-melting furnaces, and are at present putting in a third. The convenience, cleanliness, and simplicity of using gas has made it preferable to all other fuels for melting white metals. The man in charge and the men on the job, it is learned from the "Gas Age-Record," are most enthusiastic over the gas-furnaces—all having had previous experience and troubles with coal-fired equipment. Here are some figures quoted by Mr. H. O. Andrew, which indicate a further strong point in favour of gas. The average temperature used is around 900° Fahr., though when melting aluminium it is necessary to get up to about 2400° Fahr. Before using gas, it required five to six hours with a coal fire for a single melt; while now, employing gas-fired equipment designed for the application, the first melt requires only an hour-and-a-quarter (except for aluminium), and successive melts three quarters-of-an-hour—with resultant labour and overhead savings due to increased output per operator and release of coal storage space for manufacturing purposes. In this class of work, on an average, from 5 to 6 lbs. of metal will be melted per c.ft. of gas. If it is desired to melt 500 lbs., it will be necessary to consume from 85 to 100 c.ft. of gas; and with a 150 c.ft. per hour burner, this will require from 35 to 40 minutes. There is, of course, a difference between the various classes of soft metal, which makes some variation in the time required to melt them down. These figures do not apply to aluminium or some of the white metals, but to the soft metals with lead as base, with the exception of various metal combinations of babbitt. The possibility of maintaining any desired temperature reduces oxidation and deterioration of the metal. The final result of using gas is a lower cost per unit of produce treated.

Manchester and District Junior Gas Association.—There is to be a visit on Wednesday afternoon, Nov. 7, to the works of Messrs. Hardman and Holden, Ltd., Miles Platting; and after tea at the invitation of the firm, Mr. E. Crowther, M.Eng., Assoc.M. Inst.C.E., of Wallasey, will read a paper dealing with "Thermal Efficiencies in Gas-Works Processes."

Exterior Gas Shut-Off Valves.—The hearing is shortly being resumed in New York by the Board of Standards and Appeals of the question of the formulation of rules for the installation and maintenance of gas shut-off valves on the exterior of buildings. The bringing into force of such rules will mean that valves will have to be attached to 160,000 buildings, at a minimum capital cost (assuming only one valve at $80 for each building) of $12,800,000. The cost of some of the valves will, however, be much more than the figure named; and in the case of many buildings, several will have to be installed. In addition to this there will be the maintenance of the appliances, reckoned at $5 per annum each, or a total, on the lowest basis, of $800,000 for the city.

XUM

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Public Works, Roads, and Transport Congress.

SIR,—Will you allow me to correct an error which has crept into the references to the Institution's session of the above, on pp. 108 and 133 of your issue of to-day's date.

The Congress opens on Thursday, Nov. 22, and the date of the Institution's session is Wednesday, Nov. 28.

W. T. DUNN.
Secretary.

Institution of Gas Engineers,
28, Grosvenor Gardens, S.W. 1,
Oct. 10, 1923.

National Gas Exhibition Programmes.

SIR,—With regard to the interesting article in your last issue, by Mr. Humphrys, on "Exhibitions Past and Present," and his reference to the Official Programme, may I point out that we have a number of these programmes still available; and if any members of the industry would care to have same, we should be pleased to forward at the rate of 7d. each, post free.

The Official Programme makes a very complete and detailed reference to the exhibits.

R. J. ROGERS,
Hon. Secretary.

National Gas Exhibition, Gas Department,
Council House, Birmingham, Oct. 12, 1923.

Broadcasting Gas.

SIR,—With reference to the letter appearing in the "Correspondence" columns of your issue of the 3rd inst., I am glad to inform you that, following negotiations with the British Broadcasting Company some few weeks back, the Association have been able to arrange for a "Talk on Gas" to be broadcasted in the near future.

I hope to be able to give you further definite information in the course of a few days.

J. F. WALKER,
Secretary and Assistant Manager.

British Commercial Gas Association,
30, Grosvenor Gardens, Victoria, S.W., Oct. 10, 1923.

Meter Capacity—not "Lights."

SIR,—As one moves about among gas men at the various meetings, it is quite common to discuss subjects relating to one's work. The new standard meter sizes seem to come in for a deal of criticism, and it is surprising how many undertakings are still buying by "lights"—and 3-lights particularly.

One hears various objections, which show that the knowledge of meters is very limited. For instance, when referring to a meter with a capacity of 60 c.ft. per hour, but in a case the size of a 3-light, a buyer remarked: "Why should we scrap 3-lights to buy 3-lights? You cannot get a quart out of a pint pot." Such a remark makes one wonder whether meters are looked upon merely as tin boxes.

The outside casing has no relation to the measuring capacity of the meter. If a pair of nominal 3-light leathers were fitted into a 100-light case, the capacity of that meter would be equal to the amount those 3-light leathers were set to deliver.

Now, the point I wish to make is that meters should be considered always in terms of capacity. The capacity of the meter per revolution, multiplied by 240, gives the capacity in feet per hour. The "240" represents the maximum number of revolutions a meter should make per hour for accurate registration. (This number varies slightly in sizes of larger capacity than 120 c.ft. per hour; a meter of 3000 c.ft. per hour only making 120 revolutions.)

If an engineer is considering (say) station meters, exhausters, governors, &c., he speaks in terms of capacity per hour. Why not, then, let the same rule apply in the case of consumers' meters? Houses or their appliances might easily be considered in terms of maximum capacity for consuming gas. Therefore, when buying meters, why not state 30, 40, or 60 c.ft. meters, fitted with ½ in., ¾-in., or 1-in. connections as required? In any event, let us buy meters suited to an increasing consumption, combined with accuracy, and not absorbing too much valuable pressure in working.

I was very pleased to learn a short time ago that a large London Company record all their meters by a dual denomination—viz., 5-light, 30 c.ft.; 10-light, 60 c.ft.; No. 2, 40 c.ft.; No. 3, 60 c.ft.; and so on.

ALBERT T. GILBERT.

Nuneaton, Oct. 15, 1923.

Public Lighting at South Molton.—At the monthly meeting of the South Molton Town Council, Mr. Clarke said that in 1913-14 the amount charged by the gas undertaking—which is owned by the Council—for public lighting was £312, and last year only £232. In view of the fact that in 1913-14 the cost of the manufacture of gas was about £1200, and last year £2400, the figures appeared to require explanation. Seeing that the undertaking was wiping off a big overdraft, he did not think it could afford to be so generous to the town. Had the town been charged the proper sum for lighting, the bank overdraft would have been cleared off long ago. Private consumers were paying 50 p.ct. more than in pre-war days. Mr. Howe (the Chairman of the Gas Committee) said this question had been a sore point with him ever since he had been a member of the Council; but he was like a "voice crying in the wilderness." The overdraft would soon be wiped out, and at no distant date they would be able to reduce the price of gas. The Town Clerk pointed out that, though during the war-time period when the Lighting Order was in force no lamps were lit, the gas undertaking were stringent in making the Council pay the same sum as previously.

REGISTER OF PATENTS.

Heating or Cooking Apparatus.—No. 202,716.

MILL, A. G., of Camberwell, S.E. 5.

No. 14,449; May 23, 1922.

This invention relates to a domestic appliance which may be a gas-fire with radiants or, by a simple conversion, a gas-cooker; and the principles claimed in the invention may also be combined with electricity as the heat source.

The apparatus consists chiefly in a rectangular upright frame with the lower part of which is mounted a pipe which is a rotatable gas-supply pipe. It carries a number of perforated tubes which are, according to need, either vertically disposed or horizontally. In the former case they come between a number of radiants supported within the frame; in the latter case they serve to support cooking utensils. The part which corresponds to the trivet plate in the ordinary gas fire may be turned outwards on a hinge, forming a rest beneath the burner bars when they are lowered.

Sector-shaped side pieces and a front plate form a canopy when the appliance is being used as a fire; and, by means of bell-cranks and links, these are rotated outwards, simultaneously with the supply-pipe and burners, so as to serve as a hood with the cooker.

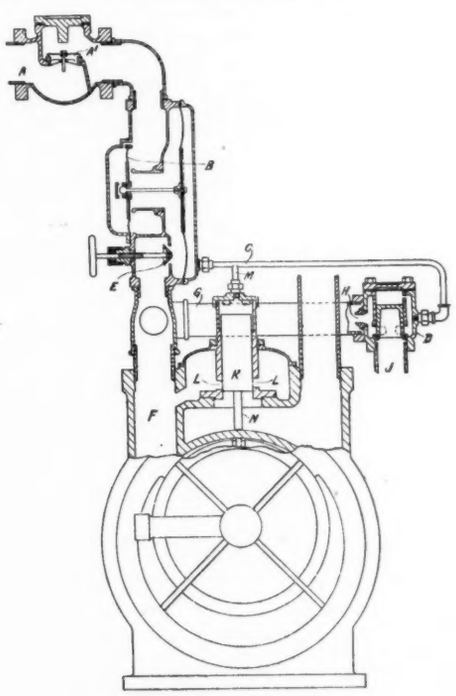
The apparatus may comprise a water-boiler, connected to hot and cold storage tanks.

Compressing and Mixing Apparatus.—No. 202,919.

KEITH AND BLACKMAN CO., LTD., and KEITH, G., both of Farringdon Avenue, E.C. 4.

No. 5182; Feb. 22, 1923.

This invention relates to an apparatus for obtaining a gaseous mixture under pressure of substantially constant proportions notwithstanding variations in the demand or fluctuations in the initial pressure of either of the constituents of the mixture. Broadly, the apparatus comprises a compressor to the inlet side of which are connected two conduits, one for each constituent of the mixture; there being fitted to one conduit a governing device which is loaded by the pressure prevailing in a connection taken from the other conduit.



A Keith-Blackman Compressor.

In the accompanying drawing, A denotes the gas-supply conduit in which is a check valve A^1, gas flowing through which passes to the inlet of the diaphragm governor B, which may work on principles covered by previous patents of the claimants. It is loaded by the pressure prevailing in the pipe C, which is taken from the casing of a back-pressure valve D. The outlet orifice from the governor is controlled by the obturator E, which is adjustable manually to obtain the desired quality of mixture. From the obturator E the gas passes to the inlet F of the compressor. Also connected to the inlet F is an air supply conduit G leading from the casing of the back-pressure valve D. Between D and G is a fixed orifice H through which air is induced by the compressor. Due to the suction of the compressor the pressure in the conduit G is lowered, so that between the two sides of the orifice H there is established a difference of pressure which increases as the demand of the compressor increases, varying as the square of the demand. Concurrently, the same pressure difference is established between the two sides of the orifice controlled by the obdurator E, as the pressure on the inlet side of the obturator is always the same as that on the inlet side of the orifice H. It follows that

the proportions of gas and air will be maintained constant, notwithstanding variations in the demand.

The back-pressure valve D performs a dual function. First, it prevents reflux of combustible mixture into the air inlet connection J, which preferably is open to the outside atmosphere. Secondly, due to the provision of the value, there is obtained a substantial depression in the pipe C, thus ensuring that there will always be a good flow of gas through the governor B, even should there be a very low pressure in the gas conduit at A in front of the check valve A^1. In order to prevent pulsation due to slight fluctuation at the inlet of the compressor, the valve is arranged to have a dash-pot action.

K denotes a pressure-regulating valve, to ensure that the outlet pressure of the compressor shall be unaffected by pressure variations at the inlet side. It is preferably constituted by a piston of such a weight that it will just lift when the maximum pressure is reached. As it lifts, its lower end unmasks the ports L, so that the excess delivery of the compressor is blown off and returned to the inlet F. The cylinder in which K moves is extended outside the casing of the compressor, and its upper side connected by a branch M to the pipe C or to the casing of the valve D. In order to prevent hunting of the piston valve, a dash-pot effect may be produced by restricting the opening to the branch M. With this arrangement, the upper side of the piston K is subject to the pressure prevailing in the casing D, so that any outward leakage past the sides of the piston is drawn back into the compressor. A pin N on the lower side of the piston K serves to prevent the piston from dropping too far below the ports L.

It may be explained that although it is preferred to provide for entry of the gas at A and entry of the air at J, the converse arrangement is equally operative. It is preferred, however, to employ the arrangement described, as the governor B has a delicate operation to perform and would be liable to be interfered with by dirt in the air.

Extracting Volatile Oils from Coal Gas, &c. No. 202,795.

IKEDA, K., ISOBE, H., OKAZAWA, T., all of Tokyo.

No. 17,708; June 27, 1922.

This invention covers a process of light-oil extraction which is based on the fact that when coal gas or natural gas which contains volatile oils is passed through acid clay such as fuller's earth or Florida earth, &c., the volatile constituents such as benzole, pentane, hexane, naphthalene, &c., are absorbed by the clay. The absorbed oils are easily set free by heating, condensed by cooling, and collected. Acidic clay does not sustain any change by this operation, and therefore it can be used repeatedly.

The clay is conveniently prepared in the following manner. It is first kneaded with water, the amount of which is so regulated that there are 80 to 110 parts of total water to 100 parts of completely dehydrated clay, and then passed through a wire gauge or other small holes by pressing so as to form it into short threads or sticks of uneven surface. Or the kneaded mass is torn irregularly into pieces the size of a walnut. The clay in such forms is then dried by heating at 150° to 600° C.

The specification describes and illustrates a simple apparatus for proceeding with the scrubbing.

Coking and Carbonizing; and Apparatus for Low-Temperature Carbonization.—No. 203,444.

KOPPERS, H., of Essen-Ruhr.

No. 17,834; June 28, 1922.

(Patent of addition to No. 184,144; Aug. 1, 1921.)

This invention is a modification of the process and apparatus claimed in specification No. 184,144, whereby carbonaceous materials are distilled by bringing them into contact with heated solid bodies—for instance, steel balls. The objects of the modification are to increase the efficiency and reliability of the process and apparatus, which are more particularly designed for the treatment of bituminous raw materials not adapted for coking by the ordinary processes.

In the parent specification the revolving tubular retort or still is described as a closed container, furnished with glands at the ends to prevent the escape of gases of distillation. These glands are now dispensed with, so as to avoid the difficulty of maintaining a gaslight joint, and also the resistance they offer to the revolving movement of the drum. The improvement effected is claimed to be important, as it is desirable that at the front end of the drum the fuel and the heated bodies should be introduced separately, so that they come into contact only within the drum.

In the present invention, the distilling drum is not provided at its ends with any glands or other arrangements for obtaining a tight joint, but is encased in a chamber, which prevents escape of the gas to the outside.

The efficiency in regard to utilization of the heat is greatly improved in the present invention by the employment of a superposed drum for drying and preheating the material. It is charged with the green fuel and with balls which have passed through the distilling drum and have already spent a portion of their heat; while the distilling drum is fed with the dried and pre-heated coal and with the freshly heated balls from a furnace.

Tests have demonstrated that the process of distillation can be considered completed when the temperature of the balls has been reduced to about 400° to 500° C., which would correspond to a temperature of the semi-coke of about 300° to 400° C. If no preheating drum were provided, the balls leaving the distilling drum being at once returned to the heating furnace, the balls would carry their residual heat into the furnace; and it might appear that, in spite of a fairly high temperature of the balls on leaving the distilling drum, there would be no loss of heat. In reality, however, a substantial loss takes place in the heating furnace, as the heating of the balls is performed on the so-called exchange principle, and the waste gases leave the furnace at a temperature corresponding to the initial temperature of the goods to be heated. The introduction of the balls into the heating furnace straight from the distilling drum, when they have still a temperature of 400° to 500° C., would therefore cause a considerable loss by way of the waste gases. For carrying out the preheating process, the balls leaving the distilling drum are particularly suitable, as they then possess the best possible temperature and are not hot enough to cause the green fuel to assume a plastic condition, which would cause parts of fuel to coalesce into lumps or to stick to the balls.

The balls are introduced into the distilling drum, which is provided with a screw thread inside, through a channel opening, having previously been heated to a temperature of (say) 800° to 850° C. in a heating furnace situate immediately above the distilling drum and casing. The hot balls, on meeting the fuel, are at once covered with a crust of the coal, whereby the outer skin of the balls is cooled down to such an extent that decomposition of the gases, when coming into contact with the surface of the balls, does take place. From the interior of the balls new supplies of heat are conducted to the surface, for further distillation of the coal—an action similar to that of the heat treatment of steel ingots in soaking pits.

Although the heated balls are the main agents of the distillation process, additional external or internal heating of the tubular retort is not totally excluded. On the contrary, additional heating may be resorted to, for the prevention of radiation losses or for other reasons, as long as this heating is kept within limits which avoid the disadvantages that occur when the total supply of heat for distillation is applied in this manner.

Gas Cooking-Stoves.—No. 203,496.

WHITELEGG, S. H., of Forest Gate, E. 7.

No. 22,075; Aug. 14, 1922.

A gas-cooker according to this invention consists of a rectangular metal container mounted on feet, the top having an aperture. Arranged radially on the top are upstanding fins on which may be placed a cooking utensil. Covering the aperture, but arranged just below, is a grill plate having a similar aperture. Arranged in the container and at a suitable distance below the grill plate are shelves on which a pan may be placed.

Rotatably mounted in bearings at one side of the container is an L-shaped burner, the head of which coincides with the apertures in the grill-plate and top-plate. The open end of the tube, which is mounted in bearings, surrounds a fixed gas-nipple to which is attached the gas-supply pipe. The burner is free to be rotated; and the various positions are controlled by a lever, handle, or other suitable means.

In use, when it is desired to heat the contents in a utensil placed on the stove, the burner is rotated so that the gas-jets are between the perforated plate and the upstanding ribs. To grill or to toast, the burner is positioned below the grill-plate. When desired, a portable oven may be attached alongside, and the burner rotated through an angle of substantially 180°, so that it projects away from the stove and into the oven.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Oct. 10.]

Nos. 24,317 to 24,938.

AMPHLETT, H. P.—"Apparatus for testing efficiency of pipe joints and strength of pipes." No. 24,710.

BEETON, H. G.—"Appliance for fixing pipes, &c." No. 24,771.

BLAKEBOROUGH, R. A.—"Means for controlling flow of liquid in pipe lines." No. 24,657.

BROADHEAD, J. B.—See Blakeborough, R. A. No. 24,657.

CUMMING, H. M.—"Means for controlling supply of gas to burners of stoves, &c." No. 24,364.

DEAN, E. S.—"Gas, &c., burners." No. 24,927.

FALLON, J.—"Gas-pressure regulators." No. 24,883.

GIBBONS BROS., LTD.—"Furnaces." No. 24,804.

GIBBS, F.—"Fire-bricks, furnace linings, &c." No. 24,692.

GLASGOW, A. G.—"Method of water gas manufacture." No. 24,778.

GLASGOW, A. G.—"Manufacture of carburetted water gas." No. 24,833.

GRAHAM, W. A.—"Bunsen burners." No. 24,822.

GREENHALGH, H.—"Self-lighting gas-mantles, &c." No. 24,654.

JAMES, G. P.—See Beeton, H. G. No. 24,771.

KEIGHLEY GAS AND OIL ENGINE CO., LTD.—"Valve operating mechanism for internal combustion engines." No. 24,679.

KOHLENVEREDLUNG GES.—"Distillation of carbonaceous substances." Nos. 24,847, 24,848.

LENNOX, A.—"Pipe joints." No. 24,931.

LEWIS, J. E.—See Amphlett, H. P. No. 24,710.

MALEY, A. W.—"Gas compressors." No. 24,756.

MERZ AND M'LELLAN.—"Low-temperature fuel distillation." No. 24,632.

NELSON, C. A.—See Lennox, A. No. 24,931.

NUTRIMENT, LTD.—See Dean, E. S. No. 24,927.

POOLE, D. C. E.—"Prepayment gas-meters, &c." No. 24,617.

RIDGILL, E.—"Conveyors for coal, &c." No. 24,758.

SCOTT, W.—"Apparatus for controlling flow of liquid or gas." No. 24,685.

SMALLWOOD, A.—See Fallon, J. No. 24,883.

STRACHAN AND HENSHAW, LTD.—"Apparatus for screening, &c., materials." No. 24,616.

WEEKS, E. G.—See Merz and M'Lellan. No. 24,632.

WILSON GAS-METERS, LTD., G., and WILSON, J. H.—See Poole, D. C. E. No. 24,617.

WOLLASTON, T. R.—"Gasification of coke breeze, &c." No. 24,440.

WOOD, T.—See Blakeborough, R. A. No. 24,657.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" with regard to applications to the Board of Trade for Orders under the Gas Regulation Act.

SPECIAL ORDER.

Mansfield Corporation.

Application is to be made to the Board of Trade by the Mansfield Corporation for a Special Order under section 10 to extend the limits of supply by the addition of the parish of Clipstone; to authorize them to use scheduled lands for gas-works purposes; to charge for gas on the therm basis; to raise further money; and to confer additional powers upon them with regard to the supply of gas.

DECLARATIONS OF CALORIFIC POWER.

Dysynni Gas Company, Ltd.—425 B Th.U. (Jan. 1, 1924.)
Horsham Rural District Council (Billingshurst).—500 B.Th.U. (Jan. 1, 1924.)
Newquay (Cornwall) Gas Company.—450 B.Th.U. (Jan. 1, 1924.)

UNEMPLOYMENT GRANTS COMMITTEE.

Assistance to Companies Undertaking Work of Public Utility.

We have received information from the Unemployment Grants Committee to the effect that, as announced in Parliament, the Government have formulated proposals designed to provide employment in depressed industries by stimulating the acceleration of work by companies operating undertakings of a public-utility character. It has accordingly been decided to extend, to such companies as are prepared during the coming winter to commence work that would not otherwise be undertaken at the present time financial assistance in respect of revenue-producing works similar to those undertaken by local authorities. Such works would include gas, water, electricity, tramways, docks, harbours, and canals. All applications should be addressed to the Secretary, Unemployment Grants Committee, No. 23, Buckingham Gate, S.W. 1.

The terms on which Government assistance will be granted to approved works are as follows:

(1) Works which would not be proceeded with at the present time, apart from the pressing need for relieving unemployment, are alone eligible.
(2) The works in respect of which assistance is desired must be of a public-utility character—*e.g.*, gas, water, electricity, tramways, docks, harbours, and canals.
(3) The works must be of such a nature as will afford employment during the coming winter in industries at present affected by severe unemployment.
(4) The Committee will require to satisfy themselves as to the reasonableness of the tender accepted for the works. It will be a condition of all contracts that the material employed shall be of British manufacture.
(5) Assistance will be limited to a maximum of 50 p.ct. of the interest on the expenditure incurred, out of capital raised, and will normally be given only for the period during which the expenditure is not reasonably remunerative.
(6) The undertaking will normally be required to submit to such limitations as to the distribution of profits, &c., during the period of assistance as may be necessary in the opinion of the Committee to secure that no undue advantage is taken of such assistance. Each case will in this respect be considered separately upon its merits.
(7) The approval of the Committee will be required for the terms on which the capital is raised.
(8) The Committee will require to be satisfied in such manner as may be mutually arranged, without interfering with the company's responsibility for the execution of the works, that the work will be or is being satisfactorily carried out, and in accordance with the foregoing conditions.

An Application from Middlesbrough.

The Middlesbrough Corporation decided last week that the Town Clerk should make application to the Unemployment Grants Committee for permission to have a scheme for the augmentation of the gasholder plant included as a scheme for the relief of unemployment with a view to a grant being made towards the cost. The Chairman of the Gas Committee was authorized to have inquiries made as to suitable sites for the erection of a new holder, and to have borings taken where he considered a site would be likely to prove suitable. If the Government will not agree to the scheme going forward, the matter will be deferred for a year. The Gas Manager has reported to the Gas Committee that an augmentation of the plant is urgently needed, for the available capacity of the existing plant is only 2½ million c.ft.—or just over one half of a winter day's delivery of gas to the town. A storage capacity equal to the maximum day's delivery, he said, is the usually accepted standard.

The Uses of Gas.—An address entitled "Hygiene and Economy of Gas" was delivered by Mr. S. Hall, Sales Superintendent of the Edinburgh Corporation Gas Department, to St. Cuthbert's Masonic Club last week. Referring to the latest uses of gas, Mr. Hall stated that in a nursing home in Edinburgh gas was used for the heating of the wards, and in the operating theatre for heating the vessels in which the instruments were sterilized. In view of this, it was impossible to refute the statement that gas was healthy.

MURDOCH CHALLENGED.

Writing in the "Yorkshire Post," Mr. Waynman Dixon, of Great Ayton, refers to an article headed "Miracles of Coal Gas," which was recently published in that paper, and in which it was inferred that Murdoch was the original inventor of the use of coal gas for illuminating purposes. Mr. Dixon states that, though Murdoch was the first to apply gas to the lighting of the Soho Works, he was not the first to discover its use, which was forty years before his time. The author goes on to say that this may be proved from Hutchinson's "History of Durham" (published in 1785), and that the credit for the invention belongs to George Dixon, of Cockfield (born 1731, died 1785), owner of many collieries in Durham County. He and his brother, Jeremiah Dixon (astronomer), are honourably mentioned by Hutchinson as "two of the most ingenious men of the age." He was the first to make coal tar near his home at Cockfield, and further experimented on the use of gas for illumination. His nephew, John Bailey, of Chillingham (born 1751, died 1819), in his book "A General View of Agriculture of the County of Durham" (published 1810) records as follows:

> I remember being much amused, when a little boy (aged 9), by George Dixon filling an old tea kettle half full of coals and setting it on the fire, and luting hemlock stems with clay to the spout, and to this several others round the end and side of a room; after a certain time he put the flame of a candle to the end of the farthest pipe, and immediately a bright flame issued from it, where nothing was visible before. He then made a small hole with a pin through the clay that luted the pipes together, and applying the flame of a candle to each there were as many flames as holes. He had only made the discovery a little before, and this was probably the third or fourth exhibition of illuminating rooms by gas light.
>
> This mode of lighting rooms was for a long time a favourite project with him, and he had thoughts of lighting his collieries with them, but was cured of it by the following experiment, at which I was present: Wanting to know the quantity of tar produced by a ton of coals, he erected a furnace with a large cast-iron boiler, in which the coals were put; to this were fixed two large cast-metal pump tubes; one of them was passed through water in order to condense the oil and tar, the end of this was filled by a wooden plug, with a small hole to let out the tar, &c. Towards the conclusion of the experiment, he placed the flame of a candle to this hole; the inflammable gas immediately burned with a large flame, to extinguish which he struck it with his hat; the flame was driven inwards, the gas in the inside of the apparatus took fire as quickly as gunpowder, and exploded with a report like a cannon, driving out the wooden plug to a great distance, and exhibiting a cylindrical body of flame of several yards length. The heavy cast-iron pumps were removed from their places. From this time he considered his project of lighting collieries or rooms with gas lights as very dangerous, and I record the experiment with a view that it may probably be a useful hint to those who are at present engaged in similar projects of lighting manufactories and great towns with a material so subject to explosion.

This experiment was made in 1760. Probably one of these later experimenters was William Murdoch; but to whom is the discovery of its use due? Let honour be given where honour is due, says Mr. Waynman Dixon, who ventures to claim it for George Dixon, of Cockfield.

A proof of Mr. Dixon's letter was submitted to Mr. Charles Hunt, an acknowledged authority on the early history of gas lighting; and from him we have received the following letter:

Sir,—There does not appear to be any inherent improbability in the statement that a Mr. Dixon experimented with coal gas in 1760, or about fifty years before Murdoch appeared on the scene. At that time the production of illuminating gas from coal was probably well known, especially by those who practised distillation of coal for the production of tar, among whom was Lord Dundonald; while Minckelers in 1784 published an account of his inquiries on the subject. It does not appear, however, that either Lord Dundonald or Minckelers attached any importance to the illuminating power of the gas produced from coal, any more than did Dixon, who seems to have regarded the use of it as very dangerous, and therefore did not pursue the subject.

Allow me, therefore, to quote from my "History of the Introduction of Gas Lighting" (p. 21) the following:

> It is, therefore, correct to say that he [Minckelers] carried the matter but little if anything further than where it had been left by previous experimenters, or by Clayton about a hundred years before. Clayton tells us that he frequently lighted-up his gas for the amusement of his friends; and Minckelers appears to have done much the same thing. Neither is, however, entitled on that account to be regarded as the inventor of gas lighting. Who, then, was its inventor? Surely he who was the first to demonstrate its utility; the first to show how it could be applied to the use and convenience of man. Such was not Minckelers, nor any of his fellow experimenters; such, however, was Murdoch.

17, *Victoria Street, S.W.*1, Chas. Hunt.
Oct. 13, 1923.

Theft of Mantles.—At the Dewsbury Police Court, last Friday, Ernest Hall, general dealer, was remanded on a charge of stealing 59 dozen gas-mantles from the warehouse of Messrs. R. Blackburn & Son, Tithebarne Street, Dewsbury, on the night of Oct. 10, and also with stealing from the same warehouse, between Aug. 1 and Oct. 10, 1574 gas-mantles. Harold Marshall, wholesale general dealer, was similarly remanded, charged with receiving 1574 mantles, knowing them to have been stolen. The Chief Constable said Hall had admitted the first offence; and inquiries suggested that he had been stealing mantles from this warehouse for some time. Marshall, when his place was searched and 1574 mantles found, said he had got them from Hall at different times, paying 2s. and 3s. per dozen for them.

A "BLUE RIBAND" CHALLENGE.

It will be recalled that Mr. R. J. Rogers, when addressing the Joint Conference of Junior Associations and Salesmen's Circles at the National Gas Exhibition last month, said he considered that, if they all worked together, they would secure for the gas industry the "Blue Riband of the Utility-Service of this Country."

The suggestion thus thrown out by Mr. Rogers has now been taken up by Mr. Harry Clark, Distribution Superintendent to the Derby Gas Company. We reproduce a photograph of a rosette made with blue ribbon, which is attracting considerable attention on one of the stands of the Derby Gas Company at the Industrial Trades Exhibition, and it is a challenge to all the other public supply services. Mr. H. Clark has given the following good reasons for his challenge:

No industry in the long category of enterprise which marked the rise of effort in the Nineteenth Century could command so much admiration from the whole world as that of the gas industry.

No industry in our time has contributed so materially to human comfort, human happiness, and the advancement of constructive enterprise in the nation itself.

During the last ten years there has been an increase of 60,000,000,000 c.ft. in the sale of gas, which is conclusive proof that the gas industry are holders of the "Blue Riband" for giving the best and most useful service to the nation and the individual.

BOROUGH OF COLNE GAS DEPARTMENT.

In his report for the twelve months ended March 31, Mr. Frederic Thorpe, the Engineer, states that the expenditure for the year was £47,341, and the income £56,643, leaving a gross profit of £9301, which is a return of 5·78 p.ct. on the capital. Interest and sinking fund contributions amounted to £8599, so that the net profit was £701, which has been carried to the gas revenue appropriation account. The price of gas was reduced from April 1 by 6d. per 1000 c.ft.; the present rates being 4s. for lighting and heating, and 2s. 9d. for gas-engines, both less a discount of 5 p.ct.

In the twelve months, 13,312 tons of coal have been carbonized. The average price of coal was 25s. 8d. per ton; and the average quantity of gas made per ton of coal was 17,346 c.ft. The total quantity of gas manufactured was 230,903,000 c.ft.—a decrease of 7·8 p.ct. The considerable drop in consumption was due to the extended slump in general trade. The net return from residuals was £9895, a decrease of £250 compared with a year ago. The quality of gas has been gradually improved; and the average value was 450 B.Th.U.

Abertillery Gas Leakage.—Last year's figure for the unaccounted-for gas in the Welsh mining town of Abertillery, which is built over a coalfield, was 20 p.ct. Mr. Jenkins, the Gas Engineer, who gave this information to the local Chamber of Trade, said that the leakage was due to the subsidence of the ground, and that the position was rapidly becoming worse.

Chesterfield Gas Undertaking.—The Mayor of Chesterfield (Alderman G. Clark), at a meeting of the Chesterfield Town Council, referred to the gas undertaking and said the price of gas, reduced in January by 6d. per 1000 c.ft., would again be reduced during the present month by 3½d. per 1000 c.ft. For the year ended March 31, the gas-works had shown a satisfactory profit.

Gas Charges at Eckington.—At the Eckington Parish Council, during a discussion on the question of lighting, Mr. T. Butler pointed out that the Council had asked the Eckington Gas Company to make a reduction in the price of gas, and that the Chairman of the Directors had promised this should be done when the dividend was slightly more. The Gas Company had afterwards declared a larger dividend, but had made no reduction. They had written stating that they could not do so. He had seen Mr. Markham, of the Staveley Company, who said he was prepared to supply Eckington with electricity for light and power. Mr. T. Lee said it was questionable whether the Staveley Company would be allowed to supply the parish with electricity. It was ultimately decided to send a further letter to the Gas Company, stating that the Council were dissatisfied with their reply.

SOME NOTES ON GAS IN GUERNSEY.

While, as is well known, there has long been a flourishing Gas Company in Jersey (where there is at present no electrical supply), the work of the corresponding Company in Guernsey is less familiar. During a recent visit to the island, the writer had the opportunity of meeting Mr. Crossley, the Manager and Secretary, and was given to understand that gas is doing well.

In the past year, 167 million c.ft. of gas were produced—a considerable amount, considering the restricted area of operations. There are several interesting features. It comes as a surprise to learn that there are over 50 miles of piping in this small island. This is accounted for largely by the many winding and narrow streets, and by the fact that many mains are carried to numerous outlying spots as well as the chief townships of St. Peter's Port and St. Sampson's. One rather troublesome factor is the hilly nature of the island and the steep inclination of streets, making the maintenance of pressure something of a problem.

Street lighting in Guernsey is almost exclusively by gas; a single inverted "medium" burner being the usual equipment, though clusters are employed at some of the main junctions of streets. Lamp-posts are infrequent, except in some of the chief streets, and lanterns are frequently mounted on brackets on private property lining the roadway. There is also a fair amount of private lighting, and a good heating and cooking load—especially from the numerous hotels in the island. One field that does not appear to have been developed as fully as might be expected is the gas heating of the many greenhouses which cover a large section of the interior. Guernsey, of course, is famous for its genial climate; and the almost complete immunity which it enjoys from frost and snow is somewhat unfavourable to artificial heating. But against this must be set the moist atmosphere, which in winter renders artificial heat a useful asset—even in this favoured spot.

Gas engineers visiting Guernsey will thus find something of technical interest. Apart from this, they will be assured of a delightful holiday, for almost all forms of sport are available in this sunny place, and there is much that is fascinating in the history and local customs, as well as the striking scenery of this and neighbouring islands.

AUSTRALIAN GAS LIGHT COMPANY.

The Annual General Meeting of the Company, held in Sydney, on Thursday, Aug. 9, was presided over by Mr. GEORGE J. COHEN (the Chairman).

The SECRETARY (Mr. C. U. B. Gurnett, F.C.I.S.) submitted the report and the audited accounts for the half-year ended June 30.

The CHAIRMAN, in moving the adoption of the report and balance-sheet, said the total quantity of gas sold in the twelve months ended June 30 was 5417 million c.ft., as compared with 5306 millions in the previous year, an increase of 2 p.ct.; while the gas consumers now numbered 178,335, showing a net increase of 8104. During the twelve months, 98 miles of mains and services were laid, making the total 3838 miles. The quantity of oil and coal carbonized during the year July, 1921, to June, 1922, amounted to 463,600 tons, as compared with 496,600 tons for the year just ended, an increase of 30,000 tons; while the cost of these commodities amounted in 1922 to £627,065, and for the past twelve months to £603,492, a decrease of £23,573. The Directors had been insistent on the policy that ample coal storage must be provided and large reserves accumulated. Yet they were only some 120 miles from what was, perhaps, the most valuable coal-field in the world. Carbonizing, as they did, over 1000 tons of coal per diem, it would be appreciated that the cost of constructing storage accommodation had been considerable, and the putting into store, and taking out of store, of coal had also played a part in the charges which the gas consumers must meet. For the twelve months the total revenue from the sales of gas was £1,474,244, as compared with £1,518,810 for the previous year. In making this comparison, however, it must be remembered that for the period ended June 30, 1922, the average price was 5s. 8d. per 1000 c.ft.; while for the last twelve months this average was, on the Company's own volition, reduced to 5s. 5d. per 1000 c.ft.—a reduction of 3d. per 1000 c.ft. to the gas user. The net revenue received for residuals in the last year was £144,031, while that for the previous twelve months was £129,066. In the matter of maintaining the supply of gas, the Company had passed through a particularly strenuous period. The cessation of work on the Maitland coalfield about the middle of April cut-off all normal supplies of coal; and much of the coal procurable proved inferior in regard to the quantity of gas obtainable. This resulted in plant having to be commissioned which under normal conditions would have been held in reserve. Thus the whole of the Company's manufacturing plant was in use during a considerable portion of the past winter; and only by the greatest efforts on the part of the staff and employees was a complete failure of the supply averted on several occasions.

The report and accounts were adopted, and a dividend for the half-year was declared, at the rate of 4 p.ct.

A very hearty vote of thanks was accorded the Directors and officers for their efficient management of the Company's business during the past six months.

Gas Prices at Liverpool.—A further reduction in the price of gas has been made by the Liverpool Gas Company; the new charge being 7·4d. per therm (approximately 2s. 11d. per 1000 c.ft.) to consumers through ordinary meters. The price of gas supplied through prepayment meters is also reduced to 8·9d. per therm, with a discount of 15·45 p.ct. The following scale of discounts will be allowed in respect of large consumptions in single premises, provided that such accounts be paid within one month. Where the consumption per quarter is over 4750 therms and under 14,250 therms, 2½ p.ct.; over 14,250 and under 23,750 therms, 5 p.ct.; over 23,750 and under 33,250 therms, 7½ p.ct.; over 33,250, 10 p.ct.

SHEFFIELD CO-PARTNERSHIP SCHEME.

At an extraordinary general meeting of the shareholders of the Sheffield Gas Company at Sheffield last week sanction was given for a scheme enabling the employees to participate in the profits of the Company in accordance with clause 15 of the Sheffield Gas Act, 1922.

Colonel H. K. Stephenson, M.P., the Chairman, said the Company now wished to put the scheme of co-partnership into operation. It was a plan whereby the employees benefited in certain circumstances when the price of gas was reduced below the basic rate of 7d. per therm. Three reductions had already been made within the past year. It seemed right, therefore, to apply the provisions of the Act which had been passed into law, and to put the scheme into operation as soon as possible. The Act provided that the employees will share with the stockholders any increase of profit which will accrue to the Company by reason of the gas being sold cheaper than the basic rate, which meant that an amount equal to one-third of the sum so earned would be equally divided between the two parties—that was, if an extra profit be made, three-quarters to go to the consumer, one-eighth to the employees, and one-eighth towards an extra dividend to the shareholders. If the price per cubic foot was reduced by one penny, three farthings would go to the public and the remaining farthing would be divided between the employees and shareholders in equal parts. He hoped the arrangement would appeal to their employees and encourage them to give something more than average service to the Company, and remember that they were not only benefiting the Company but the city of Sheffield and themselves too.

In reply to questions, the Chairman stated that the scheme would apply to all employees of the Company, numbering about 1200 clerks and workpeople generally.

The resolution was carried unanimously.

HEATING OF LONDON COUNTY HALL.

With the aid of lantern slides, an excellent description was given on Tuesday evening of last week, at Caxton Hall, before the Institution of Heating and Ventilating Engineers, of the plant installed for the heating and ventilation of the new London County Hall—the authors of the paper being Mr. P. M. B. Grenville and Mr. T. Moodie, M.I.Mech.E.

The whole of the building, from the basement to the sixth floor inclusive, is heated by a centralized system of low-pressure hot water, with forced circulation, from four multitubular boilers, each containing 869 sq. ft. of heating surface, and 30 sq. ft. of grate area. The total number of radiators is 2138; and they are generally of the ventilating type, fitted with baffle plates and a fresh-air inlet register of special design, allowing for easy cleaning and visible adjustment. Seven control chambers are provided in the sub-basement, each of which deals with a section of the building, and contains flow and return distributing headers from which are taken the distributing mains. These distributing mains are fixed in the sub-basement and basement, and serve the branch mains and risers to the radiators on all floors. The connections between the radiators and the risers are mostly in copper, to allow of free expansion of the risers, which are anchored in the centre, and are free to expand in either direction.

For the supply of hot water to the whole of the lavatories, two storage calorifiers are provided, each of 2000 gallons storage, and capable of raising 1700 gallons per hour from 60° to 160° Fahr. with exhaust steam. There are 802 basins and sinks, and the length of longest circulation is 1600 ft. The maximum quantity of hot water which could be drawn off in an hour is 7400 gallons. The hot-water services for the kitchens and serveries are dealt with by three separate plants, with steam calorifiers automatically controlled. Special arrangements (which are of interest to note) have been made for providing a continuous service of heating and hot-water supply for the two suites of residential quarters on the sixth floor, if the main plant is entirely shut down. In the ordinary way, the supply is taken from the main plant; but gas-boilers have been installed which come into commission as required, so that it is not necessary to run the whole plant for a few rooms.

The heating and ventilating of the Council Chamber itself was dealt with separately. After investigation, it was concluded that the most satisfactory system to adopt for this purpose would be one in which the air was delivered at low velocity and distributed equally over the whole of the lower part of the chamber, with extraction through the ceiling by separate fans. The air-conditioning plant comprises a humidifier and automatic control gear, air-heating batteries, fans, ice tank, and water circulating pump. Regulation of relative humidity is obtained by automatic control of the water spray, which is heated by a thermostatically controlled steam injector. In hot weather the ice tank cools the spray water, and prevents the temperature of the air rising unduly. Automatic control is provided for maintaining the requisite temperature. The distributing piping for the Council Chamber consists of a somewhat complicated system of sheet-metal trunking, which is now generally known as the "Octopus," from its fearsome appearance. The "tentacles" are taken to a special inlet register at each seat, and also to inlets round the chamber and galleries. The seat registers are so arranged that the occupant can direct the incoming air either towards himself or vertically out of his range; but it cannot be shut off. The capacity of the plant is equal to delivering 3000 c.ft. per hour for every occupant of the chamber.

Tunbridge Wells Gas Company.—The Company, who have recently secured the services of a cookery expert, have found their enterprise well rewarded. Thrifty housewives who are eager to learn modern methods have been impressed by the demonstrations; and the knowledge gained in this way will do much to bring about a realization of the value of gas in the home.

WOLVERHAMPTON GAS ORDER.

Mr. H. C. Honey (Director of Gas Administration) sat at the offices of the Board of Trade last Friday week to consider an Order made by the Board under the Gas Regulation Act, 1920, on the application of the Wolverhampton Gas Company. Notices of opposition had been entered by one or two opponents; but these had been settled with before the date of the public inquiry. The proceedings therefore were more or less of a formal character. The chief opponents had been the Wolverhampton Corporation and the London, Midland, and Scottish, and the Great Western Railway Companies; and their objections had all been on points of detail. Col. E. J. H. Cox (Messrs. Dyson, Bell, and Co.) appeared for the Wolverhampton Gas Company; and, though formal notice of objection had not been made, the Alkali Manufacturers Association were represented by Mr. W. A. Clark (Messrs. John Kennedy and Co., Parliamentary Agents).

In the circumstances of there being no real opposition, Mr. Honey decided to go over the main points in the Order with the promoters.

Col. Cox explained that the Corporation and the two Railway Companies had been settled with. The Railway Companies had been satisfied with the insertion of a proviso to clause 43, which gives the Gas Company power to lay pipes in private streets. By the proviso:

> Nothing in this section shall apply to any existing street belonging to, and forming the approach to, any station or depôt of the London, Midland, and Scottish Railway Company or of the Great Western Railway Company, except with the consent of the London, Midland, and Scottish Railway Company, or of the Great Western Railway Company, as the case may be; but such consent shall not be unreasonably withheld, nor shall the company, in carrying out the works authorized by this section, unreasonably obstruct or interfere with the convenient access to any such street or depôt.

The principal clauses of the Order were then dealt with seriatim.

Clause 4 provides for the exchange of two pieces of land, each about one acre in extent, and belonging respectively to the Gas Company and the Great Western Railway Company; it being found that such an exchange would be to the convenience of both parties.

On this clause, Mr. W. A. Clark, on behalf of the Alkali Manufacturers' Associations, asked that the usual one-third residuals clause should be inserted in respect of this exchange of land, which was equivalent to the acquisition of additional lands on the part of the Gas Company. As the Order stood, the Gas Company sought to apply to this exchanged land the powers which they now possessed (which were very wide indeed) in regard to the manufacture of residual products; and the Alkali Manufacturers' Association felt that this was a case in which they should ask the Board of Trade to insert the Model Clause, which gave the one-third restriction. In most cases in Parliament where promoters asked for additional lands, the Model Clause was inserted, notwithstanding the existence of very wide powers in the promoters' previous Acts of Parliament. This question had first arisen between the alkali and chemical manufacturers and the gas industry in 1912, and the Model Clause was framed in 1914, since when various Parliamentary Committees had insisted on the insertion of the one-third clause, unless there were special circumstances. He was not aware what were the present arrangements at Wolverhampton; but if the Company did not work-up their own residual products or buy from other companies, then the clause could not hurt them. On the other hand, if they did, it was in the case of such large companies as the Wolverhampton Gas Company that Sir Harry Samuel's Committee originally inserted the clause for the protection of chemical manufacturers. It was definitely stated that in the case of the larger companies there should be some restriction, and it was because of this expression of opinion that the Model Clause had been framed.

Col. Cox said the Model Clause was intended for cases in which gas companies came to Parliament for absolutely new lands. In the present instance it was merely an exchange of two small areas of land, close to each other, which both the Railway Company and the Gas Company could make better use of if the ownership were reversed. The circumstances were not at all those which were contemplated by Parliament when the Model Clause was framed. Parliament as recently as 1900—comparatively recently in these matters—gave the Company full powers without the one-third restriction over the piece of land it was proposed to exchange; and this piece of land was situated a little further away from the gas-works than the piece which was to be received. As a matter of fact, there was a restriction in regard to the use of the original piece of land which was being applied to the piece to be received from the Great Western Railway Company, and this was inserted on account of opposition from the local people directly affected, and not from an Association dealing with a general matter. By this protection in the Act of 1900, the Gas Company were prevented from making any chlorine or sulphuric acid other than that, if any, produced in the manufacture of gas according to the ordinary methods in use. Therefore, the local people came to Parliament in 1900 and got their own particular protection. On two grounds, consequently, he opposed the insertion of the one-third residuals clause. First, the local people had already obtained the protection which they required; and, secondly, this was not a case of the acquisition of new lands. The present Order had received the careful scrutiny of the Corporation, the Chamber of Commerce, and the local people generally, and none had asked for such a clause as that proposed.

Mr. Clark replied that the restriction imposed in 1900 dealt only with chlorine and sulphuric acid; there was nothing in the Act restricting the Company in regard to any other products or materials or to selling to other gas undertakings, which was the main object of the Model Clause. In other words, there was nothing to prevent the Gas Company conducting the business of chemical manufacturers. Moreover, the controversy between the alkali and chemical manufacturers and the gas industry had not arisen in 1900.

Col. Cox objected to the general case on this point being argued without reference to the particular instance of Wolverhampton. As the matter stood at present, the Wolverhampton Gas Company could not manufacture any chlorine or sulphuric acid at all, except that produced in ordinary gas-works practice, and to this extent the alkali

manufacturers were protected to a greater degree than they would be under the one-third clause.

Mr. CLARK said there were Parliamentary precedents for granting the one-third clause even where absolutely new lands were not acquired. The Chesterfield Corporation Bill last session was a case in point.

Col. COX remarked that that was a Consolidation Bill, which was entirely different, and brought up for review every enactment which the gas authority had. In effect, a Consolidation Bill was asking for a new Parliamentary franchise.

Mr. HONEY asked what the Wolverhampton Gas Company were now doing in the matter of residuals.

Col. COX replied they were extracting benzole; but they did not work-up their tar, and they had no chemical processes at work.

Mr. HONEY: So that it is really a matter of principle on both sides?

Col. COX stated that it was difficult to foretell the trend of development in the gas industry; and the Company desired to keep every atom of power they now had.

Mr. HONEY: We shall have to consider what we will do with regard to this.

Mr. Clark then withdrew.

Under clause 16 of the Order, a quarterly sliding-scale is provided for; and this was a point commented upon by Mr. Honey.

Col. COX said the Corporation were satisfied that any benefit accruing to the Company under this would correspondingly accrue to the consumer. As a matter of fact, by having the quarterly sliding-scale, there was greater incentive to the Company to reduce the price of gas than in the case of a half-yearly or yearly sliding-scale. In the latter case, if there were a strike during the year or something like that, the Company did not have the same incentive to reduce the price. The Corporation were satisfied the consumer got a distinct benefit under this arrangement, as well as the Company.

Clause 18 was next dealt with. It reads as follows:

> In case in any year or half-year, the funds of the Company which the Directors may consider applicable to the purposes of dividend shall be insufficient to pay the full amount of dividend at the authorized rate on each class of ordinary stock in the capital of the Company, the dividend on each class shall be reduced below the authorized rate by a like amount.

Mr. HONEY pointed out that this clause was not in the usual form.

Col. COX agreed, but added that the Company were particularly anxious to have it, for the reason that under the present arrangement it could so happen that in certain circumstances the 10 p.ct. people would get less than the 6 p.ct. As a matter of fact, the Company had been compelled to work on the lines of clause 18 for some time past. He had got out some figures showing this.

Mr. HONEY said he would like to have a copy of these figures, if only to justify to the Department the passing of this clause.

Clause 19 provides for the transfer of any excess profits, over the authorized rates of dividend, to the credit of the divisible profits for the following year; and the absence of the ordinary proviso as to carry-forward was commented upon by Mr. Honey.

Col. COX explained that this point had been discussed at length with the Corporation, who had said they had no complaint to make as to the way the Company were carrying on their business. In the circumstances, they were convinced that the Directors would not do anything in the matter of the carry-forward to the prejudice of the consumers. The Corporation did not therefore insist on the imposition of the usual carry forward clause; and he asked Mr. Honey to authorize this arrangement. It was, as a matter of fact, part of the settlement with the Corporation. The present carry forward was £48,000; but contracts in respect of the conversion from horizontal to vertical retorts amounted to £40,000, and the replacement of the siding would also cost a large amount, so that the whole of the present carry forward and the sum in the special purposes fund would be disposed of.

Under clause 25, power is taken to reduce the number of Directors, so that the number at any time shall not be less than five. This would involve a reduction of two. It was explained that the number was reduced in 1893, and it was now desired to reduce again.

Clause 30, giving the Directors power to determine the remuneration of the auditors, was objected to by Mr. Honey, who thought it ought to come out.

Col. COX said the reason for asking for this power was that experience had shown it to be possible to get the work done more economically if the matter were left in the hands of the Directors than if the remuneration was settled once a year at the annual meeting. This was his experience as a Director of commercial companies.

Mr. HONEY said the view of the Board of Trade was that the auditor should be the servant of the Company, and not of the Directors.

Col. COX accepted the ruling of the Board. The point was apparently, he said, that in the case of a badly-conducted company the Directors might give a fat fee to the auditor, and anything might happen. This view had not occurred to him.

Clause 35, giving the Company the right to enter into agreements for bulk supply, had been struck out by the promoters, who already have a bulk-supply clause, and objection was taken by the Railway Companies to the one originally in the present Order.

Clause 36 deals with discounts, and gives power to allow discounts not exceeding 10 p.ct. for prompt payment or large supplies, provided that all discounts are of equal amount in like circumstances. It was explained that under clause 44 of the Company's Act of 1893 everybody had to receive the same discount irrespective of circumstances. The present clause was asked for as there had been some doubt whether the clause dealing with discounts in the Gas-Works Clauses Act would give the Company the freedom desired in this matter while clause 44 of the Act of 1893 still existed.

On the suggestion of Mr. HONEY, clause 44 of the Act of 1893 was repealed, and clause 36 of the present Order was struck out, words being added to incorporate the Gas-Works Clauses provision.

Another matter to which reference was made was a new clause, reading as follows:

> The last proviso to section 4 (power to construct new gas-works) of the Act of 1900 is hereby repealed, and the following proviso substituted:
>
> Provided also that of the total amount of gas manufactured by the Company in any year, not more than fifty per centum, or such other percentage as the Board of Trade, on the application of the Company or of the Mayor, Aldermen, and Burgesses of the Borough of Wolverhampton as the the case may be, shall from time to time approve, be water gas.

Mr. HONEY said he could not pretend to like the clause very much. He presumed "water gas" meant blue water gas.

Colonel COX said this was so. The Corporation would not agree to the complete repeal of the proviso to section 4 of the Act of 1900, and the position of the Company was that they did not wish to be in a worse position than anybody else. When the time came for general restrictions upon the gas industry in this matter, then the Company would necessarily have to come under them.

This closed the inquiry.

In addition to the matters mentioned above, the Order empower the Company to issue, as preference stock, the moneys authorized to be raised under the Company's Act of 1900 as ordinary stock. It also gives new borrowing powers and powers for the issue of debenture stock at 6 p.ct., any other rate to be subject to the consent of the Board of Trade. The Company are also empowered to issue the preference stock or debenture stock authorized by this Order as redeemable preference or debenture stock. The existing capital is divided into 10 p.ct. and 6 p.ct. stock; and any additional capital authorized by the Act of 1900 and raised as ordinary stock is to be 6 p.ct. stock. The sliding-scale is 5s. per £100 of stock for every ¼d. per therm above or below the standard price. Other matters dealt with are the creation of a special purposes fund and a renewal fund, and a number of other standard matters in common form.

TRADE NOTES.

Podmore Burners, Lamps, and Fittings.

Messrs. A. E. Podmore & Co., of No. 34, Charles Street, Hatton Garden, E.C. 1, have forwarded a copy of the second edition (October, 1923) of their catalogue containing a selection of their well-known patented and registered burners, lamps, and fittings. These include the "Ivex" patent dust-proof bunsen burners (single and multiple) for every class of indoor lighting; some of these burners being shown in connection with the firm's artistic spider fitting and carrying vitreosil globes. Included in the list is a safety garage lamp, and a good selection of outdoor lamps both for shop and street lighting. One of the latter type is illustrated fitted with controlling apparatus for shutting-off burners either separately or simultaneously at any time.

"The Business World."

There has been forwarded by Messrs. F. W. Berk and Co., Ltd., chemical manufacturers, whose head office is at No. 1, Fenchurch Avenue, London, E.C., a copy of a booklet entitled "The Business World," containing particulars and illustrations of a great number of the more important towns and cities. Well known, and of large experience in their sphere as acid and chemical manufacturers and merchants, any views expressed by the firm naturally carry weight; and it will, therefore, be gratifying to all business people to note their statement that "there could hardly be found a better augury for the coming period of normal successful trading than is furnished by the increased activity and accelerated progress in the industries represented by them." As to the firm's experience, it may be mentioned that the business was founded by Mr. F. W. Berk as far back as 1870.

A Meldrum Exhibit.

Messrs. Meldrums Ltd., of Timperley, near Manchester, are again showing at the exhibition of the South Wales Institute of Engineers. Their display includes: One of the Meldrum sprinkler stoker fronts, showing sprinkler gear in operation. There are only two moving parts exposed to heat and grit. A forced-draught furnace front for one flue of a Lancashire boiler, fitted on stand, with short grate of Meldrum patent interlocking firebars; also the special devices for smoke-consuming—*i.e.*, the well known valvular deadplate, and the special bridge for the admission of secondary air. New patent Meldrum 100 p.ct. duff bars. Model of Meldrum destructor furnace for burning low-temperature carbonization residue, in connection with steam raising. Various steam-jet apparatus, &c. Meldrum centrifugal pump in Meldrum acid-resisting metal. This is an entirely new design, and shows greater efficiency than previous ones. Various samples of combustible refuse used for steam raising on Meldrum furnaces. Coloured prints showing Meldrum forced-draught furnaces, mechanical stokers, destructor furnaces, gas washer-scrubber, &c. Samples of Meldrum acid-resisting metals for testing by engineers interested.

Ripon Gasmen-Electricians.—The Ripon City Council—an authority who, despite a demand for current, turned-down a recent scheme for purchasing the plant installed at one of the war-time camps in the neighbourhood—are now taking a referendum of ratepayers as to whether they should embark on the supply of electricity. The scheme submitted involves (*a*) the utilization of a portion of the existing Corporation gas-works as a power station, with very slight alteration; (*b*) that the dynamos shall be run by gas-engines, and town gas supply the power; (*c*) that the electrical plant be operated by the present gas-works staff, who, after some initial training, should be able to run the undertaking with assistance until the demand is such as to warrant the addition of an electrical staff; and (*d*) that a direct-current supply on the three-wire system, giving 230 volts for lighting and 460 volts for power, be adopted, this being effective and simple to manage when run from gas-engines. It is estimated that the initial expenditure will be approximately £6100 and the running costs, including loan charges, &c., for the first year, £883; but it is expected that after a year there will have to be an additional generating set, with extra mains and meters, so that a total of £10,000 will be the probable capital required.

XUM

THE NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

The Newcastle market remains firm for all positions, owing to a continued steady demand for all kinds. Contractors are stemming tonnage for their full quantities, colliery turns are full, and the shipping places are congested. In consequence, there is no great quantity of free coal on the market, and collieries are holding out strongly for their prices. Best gas makes are fully 24s. 6d., and seconds 22s. 6d. to 23s. f.o.b.

As mentioned last week, the continued firmness of the market is leading buyers to take a more serious view of the forward position, and to realize that, if they want to buy for next year, they must get their ideas up to nearer those of the collieries, who are otherwise quite content to hold their coal and await events. There has been a good volume of inquiry during the week, and considerable quantities of coking coal are said to have been sold over next year, at various prices. Best qualities of gas are being negotiated on a basis of 24s., which has been done over the whole of next year. Sellers are holding firmly to this figure, and maintain an optimistic take it or leave it attitude, without appearing at all anxious to sell. Whether this will be anything like the market value when the time comes for delivery remains to be seen. In the present unsettled state of the European markets, deals in coal appear to have an even bigger element of speculation than usual.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

There are spot lots of gas coal on offer; but they are not so considerable as to affect prices, even though accelerated deliveries at some of the works are on a scale which makes them difficult to handle at this early period of the winter season. The stronger pull on soft coals for the household trade tends to balance the market and prevent any weakening of values. Sales are made for domestic consumption at firm rates so far as high grades are concerned. The lower grades are quiet. Stocking is not being speeded-up as the trade would desire. There is more briskness in slacks. Prices, though not quotably altered are less irregular.

No improvement is discernible in the industrial consumption of fuel. The improved tone in slacks is probably due to postponement of buying last month, in order to take full advantage of the downward tendency of the market in negotiating new contracts.

The coke position is still dominated by the export market. While most of the suppliers are ready and anxious to honour the new understanding as to a reduction of blast-furnace coke from 26s. to 24s., at ovens, there is no great freedom of supplies. The recent stiffening of gas-coke prices is fully maintained.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From a Local Correspondent.

The majority of the gas coal contracts in Yorkshire and Lancashire has been fixed, and there does not appear to be any surplus fuel available for "spot" orders.

There is a general uncertainty in the shipping section, caused by the Ruhr situation; and sales are being made from week to week. Collieries are looking forward to increased prices in the near future; but exporters, on the other hand, view the situation in a different light.

There is a slight falling off in the demand for house coal from local centres, probably due to the mildness of the weather and the fact that the buying public evidently anticipated advanced figures in October. Collieries still report no lack of orders for the better qualities of household fuel, and the secondary descriptions remain firm.

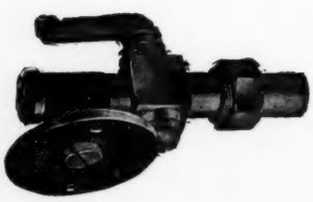
Industries generally are not improving, and consumers in this direction are taking a very small percentage of their ordinary supplies.

Holder Damaged by Gale.—In a fierce gale at Penryn last week, a holder at the local gas-works containing 30,000 c.ft. of gas was dislodged; and it was due to the prompt action of the Manager (Mr. J. Sullivan) that the town's supply was not cut off. During the storm three of the wheels which control the action of the holder were broken; the stress being thrown on one wheel. Mr. Sullivan procured ropes, and gradually got the holder on the level, after which the gas was discharged and the container lowered. An old holder has been refitted to maintain the supply while the damaged one is being repaired.

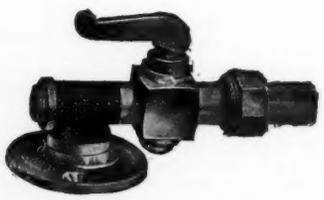
Price of Gas in Birmingham.—In presenting their report to the Birmingham City Council, the Gas Committee, who recommend a reduction of 6d. per 1000 c.ft., point out that since their last report there has been an increase in the price of coal, but that this has been met by economies of production and increased receipts from coke and other residuals, while substantial savings will result from reductions in railway rates, salaries, wages, and taxes. In addition, it is anticipated that meter repairs will show a reduction, and that the bringing into operation of the new vertical plant at Nechells will assist in lowering working costs.

A District Board for the South Wales Coke Industry.—A joint meeting of the representatives of the owners and of the workmen employed in the coke and bye-product industry in South Wales has been held at Cardiff, to consider a claim made for an increase in wages. Mr. F. L. Jacob presided on the owners' side, and Mr. Enoch Morrell over the workmen's representatives. After a lengthy discussion, it was agreed that an advance of 5 p.ct. be made to the workmen concerned, to operate as from Oct. 1 to Dec. 31. It was further agreed to set-up a Joint Sub-Committee, consisting of six members from each side, to formulate a scheme for the establishment of a District Board to deal with all matters affecting the class of workmen indicated.

TWO-WAY GAS FIRE TAP



USED AS STRAIGHT-WAY TAP



USED AS ELBOW TAP

The alteration is made by changing the position of screwed plug.

SAWER AND PURVES

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WIRES { "Sawer Manchester." "Sawer Nottingham."

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CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Oct.* 15.

Considerably more interest is being taken in pitch, and prices are advancing. To-day's value is from 137s. 6d. to 140s. per ton f.o.b. makers' works. Creosote is a firm market at 9¾d. to 10d. per gallon net in bulk. Solvent naphtha is quiet, the price of 95-160 being about 1s. 6d. per gallon at makers' works. Pure benzole is about 1s. 7d. to 1s. 8d. per gallon, and pure toluole about 1s. 10d. per gallon. Pyridine bases continues in demand; the price for prompt being about 22s. 6d. per gallon, and for forward about 20s. per gallon. Other tar products in the London market are without change.

Tar Products in the Provinces.

Oct. 15.

There has been a further improvement in the tone of the pitch market during the past week. Although very little actual business has been reported, yet it is certain that buyers would pay prices to-day which last week they would have refused. Manufacturers are naturally getting rather nervous in view of the advance which has taken place, and are not very anxious to commit themselves further at present. Creosote remains steady, and a fair amount of business is taking place at ruling figures. All water white products are very weak indeed, being adversely affected by the last fall which took place in the price of petrol and the continued reports that a further reduction will come about at an early date. Carbolic acid maintains its position; but there is not very much business available. Naphthalene is quiet, and sales are difficult to negotiate.

The average values for gas-works products during last week were: Gas-works coal tar, 77s. 6d. to 82s. 6d. Pitch, East Coast, 132s. 6d. to 135s. f.o.b. West Coast—Manchester, 127s. 6d. to 130s.; Liverpool, 128s. 6d. to 131s.; Clyde, 129s. 6d. to 132s. 6d. Benzole 90 p.c.t., North, 1s. 0½d. to 1s. 1d.; crude 65 p.c.t. at 120° C., 9½d. to 10d. naked at makers' works; 50-90 p.c.t., naked, North, 1s. 5d. to 1s. 7d. Toluole, naked, North, 1s. 5d. to 1s. 7d. nominal. Coal tar crude naphtha in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 1s. 2½d. to 1s. 4d. Heavy naphtha, North, 1s. 5½d. to 1s. 7½d. Creosote, in bulk, North, liquid, 8d. to 8½d.; salty, 7½d. to 8d.; Scotland, 6¾d. to 7½d. Heavy oils, in bulk, North, 8½d. to 9d. Carbolic acid, 60 p.c., 3s. 4d. to 3s. 5d. prompt. Naphthalene, £15 to £16; salts, £6 to £8, bags included. Anthracene, "A" quality, 4d. per minimum 40 p.c., purely nominal; "B" unsaleable.

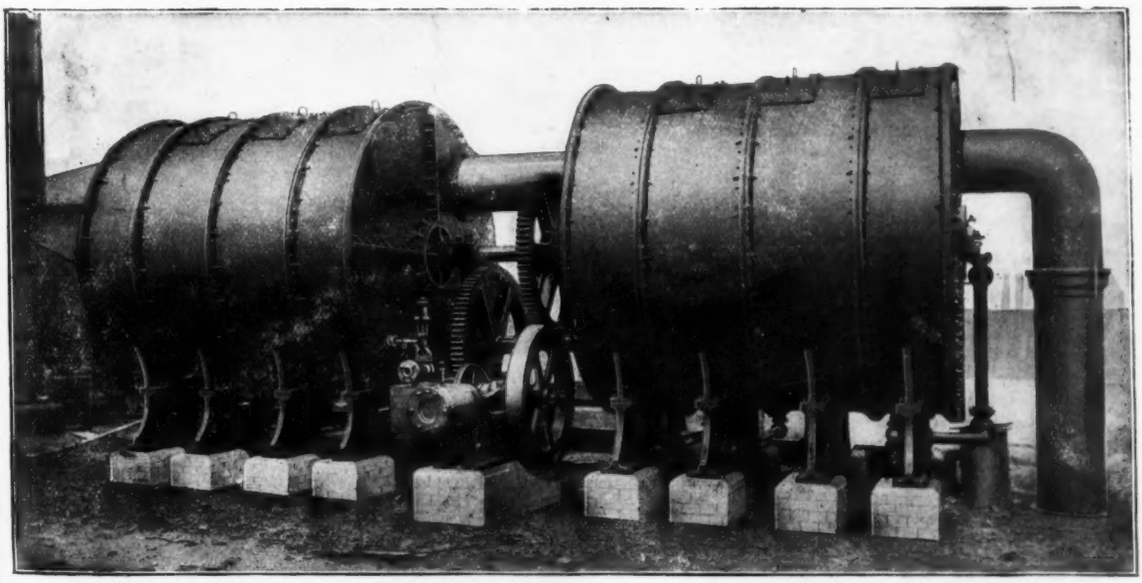
Included in schemes sanctioned by the Government for a grant at Redcar are the laying of a new gas-main to Dormanstown, the extension of the existing mains to meet the larger needs of a growing town, and the construction of a new gasholder.

Price Reductions at Reading.—The Reading Gas Company have made five reductions in price during the last fifteen months, representing a saving to consumers of nearly 1s. per 1000 c.ft.

Gas and Electricity at Accrington.—The relative values of gas and electricity were debated by the Accrington Town Council, when objection was taken by Councillor Palmer to the laying of gas-mains in a new road. He contended that for equal illumination electricity was cheaper. Fifty gas-lamps in Accrington, burning for 2000 hours, cost £68 15s., where light of equal intensity by electricity cost only £50. Mr. Aspin said a gas expert could prove that gas far excelled electricity in lighting value and cheapness. Why were towns reverting in their street lighting to gas? He suggested that the Watch Committee should experiment by adopting the challenge of the Manager of the Accrington District Gas Board to have different wards lighted by gas and electricity. Mr. Halstead thought the Lighting Committee had too many members of the Gas Board on it. He suggested youth might with advantage be blended with experience. Alderman Rawson thought there was ample room for both gas and electricity. Alderman Higham (Chairman of the Electricity Committee) said gas was preferable for lighting huge open spaces, and that it would be uneconomical to upset existing standards. It was a great mistake, however, to instal gas in new roads.

Truro Gas Company and Electricity.—Presiding at the annual meeting of the Truro Gas Company, Mr. W. Bryant said there had been a decreased income from the sale of gas, as anticipated, on account of the reduction in price. As to the possibility of electric light being introduced into the city, he would like to see it. The Directors had always favoured it—provided it could be obtained without expense to the rates, for any such loss meant that the Gas Company, a competitor, being the second largest ratepayer in the city, would have to help to pay the loss. What effect the introduction of electric light would have upon the Gas Company, was difficult to prophesy. Where, however, electric light had been supported, it had resulted in a great increase in the consumption of gas. He saw no reason why the same experience should not be met with in Truro. Replying to a vote of thanks to the staff, Mr. S. J. Ingram (the Managing-Director and Engineer) said that, whatever had been in the minds of some people, they could truthfully declare that they had not placed any obstacle in the way of the introduction on a proper basis of electric light into Truro. They thought Truro should have an electric light supply; but it should be on the most modern system, and economically sound. They would have much preferred the direct-current supply to long-distance transmission. While admitting that the Cornwall Electric Supply terms accepted by the Corporation were generous, he did not think it was possible for the Corporation to get a supply on an economic basis. This was where the Gas Company would come in; and the optimistic outlook foreshadowed by the Chairman would be realized. The Corporation proposed to charge 10d. per unit for power. There was no reason why the Gas Company could not give an independent supply to customers at much less cost.

ROTARY SCRUBBER WASHERS



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World Coal Production and Reserves.

The story of world coal production and the share supplied by the United States is told in some figures compiled by the "Trade Record" of the National City Bank of New York. The tabulation shows that the world's coal output, which stood at 1,141,600,000 short tons in 1910 (the earliest official figures), had advanced to 1,478,000,000 tons in 1913 (the year preceding the war), then dropped to 1,170,000,000 tons in 1915, slowly advancing to 1,306,000,000 tons in 1918 (the closing year of the war), and stood at approximately 1,332,000,000 short tons in 1922. Accepting unofficial figures of production for earlier years, the total world output grew from 12,000,000 short tons in 1800 to 80,000,000 tons in 1850, 800,000,000 tons in 1900, 1,478,000,000 tons in 1913, and 1,332,000,000 tons in 1922. Meantime the United States production grew from 20 long tons in 1814 to 6,000,000 tons in 1850, 240,000,000 tons in 1900, and 608,000,000 tons in the high record year 1918, dropping to 411,000,000 tons in 1922, the lowest record since 1908. A world geological congress which met in Canada just before the war with the special purpose of discussing the coal reserves of the various parts of the globe came to the conclusion that the United States had slightly more than one-half of the world's known "coal reserve"—estimating their underground coal supply at 3,854,000,000,000 metric tons, against 1,234,000,000,000 tons in Canada, 996,000,000 tons in China, 403,000,000,000 tons in Germany as it then existed, and 190,000,000,000 tons in Great Britain.

Meter Testing in Birmingham.—As showing the extent of the business carried on, it may be mentioned that in Birmingham 115,052 meters were officially tested last year. The figure in 1922 was 80,842, and in 1914 65,455. Last year's figure constitutes a new record. The number of meters rejected for defects was 5 p.ct. against over 6 p.ct. in the previous year. The income in the way of testing fees received by the Birmingham Justices, who are responsible for this work, was £6418—an increase of £2000.

Electricity Scheme for Welshpool.—The Welshpool Town Council, who some months ago were asked by the Welshpool Gas Company to give their assent to a Provisional Order from the Electricity Commissioners enabling the Gas Company to undertake an electricity scheme for the borough, were advised by the Town Clerk that if it unreasonably withheld assent the Company could demand an inquiry before the Electricity Commissioners; and expenses incurred by the Counsel preparing their case would be payable out of the rates. He was of opinion that if it was desired to obtain an electricity scheme for the town, the best course for the Council to adopt was to assent to the Gas Company's application, reserving to themselves, if they so desired, an option to purchase the undertaking at the expiration of a period of years, upon terms to be embodied in the Order. The Council decided to defer a decision and to write to the North Wales Electric Power Company asking what developments they were likely to make in supplying current in bulk to towns in Montgomeryshire.

Brighton and Hove Gas Company.—The Company announce that 1d. per therm will be taken off the price of gas; and that the deduction will be made from the Christmas meter readings. This reduction will bring the cost of gas to 9½d. per therm, and will mean the saving of £40,000 to the consumers in one full year.

Where Gas Scores Heavily.—An electric-light scheme in course of consideration for the mining townships of Carcroft, Adwick, and Skellow, near Doncaster, is explained as likely to cost approximately 1s. 9d. per week for a six-roomed house. The Gas Company have circularized householders that gas lighting costs only 1s. 2d. per week for the same sized house; and the electricity enthusiasts are finding this argument a formidable stumbling-block.

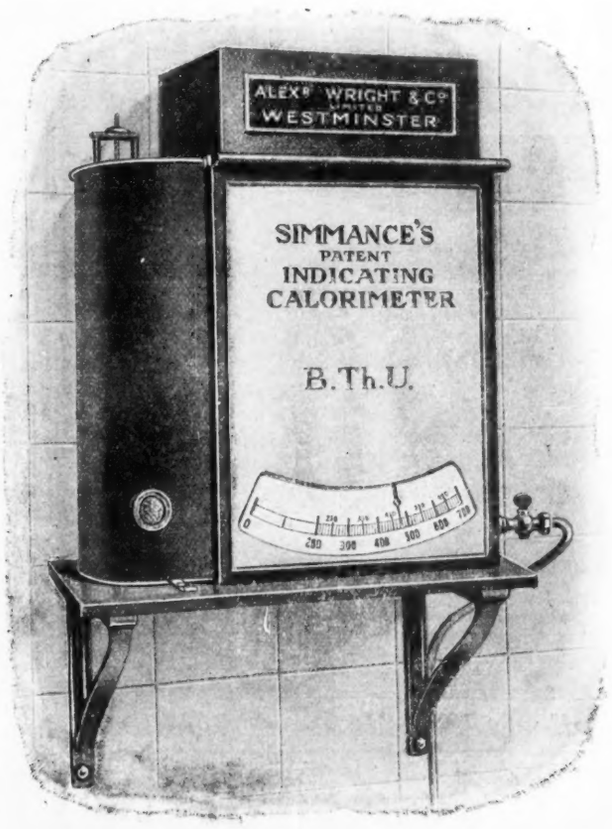
Electricity Prices at Torquay.—At a meeting of the Newton Abbot Urban Council, Mr. G. H. Hearden suggested that the proposed reduction from £1600 to £1580 for the cost of electricity purchased for the purpose of public lighting from the Torquay Corporation was absurd. The Corporation had stated that fuel and labour accounted for only 1 p.ct. of the cost of the current—a statement which he did not believe. He moved that a special meeting of the Lighting Committee be called to investigate the matter.

An "Ill" Wind.—Grange-over-Sands Council are very indignant with an Electricity Company of a neighbouring town, on which it had depended for street lighting. The Company and the Council could not come to agreement on all points; and latterly the Company have not answered correspondence from the Council. The Council have now had the lamps converted to gas lighting, and declare that the Electricity Company are morally responsible for the cost of this conversion. It is again being discovered that gas lighting is most effective.

Mouse Holds up a City.—Through a mouse having crept into the air gap between two 6000 voltage cables on Oct. 2, Aberdeen's electricity supply for motor power and lighting was cut off. The massive door of the switch-chamber at the generating station was blown out, the main cables and much machinery were wrecked, and the place was enshrouded in a curtain of flame and smoke. Serious dislocation of tramcar traffic was caused, lighting gave out, and lifts were held up. Shipping was also delayed, as the electrically-controlled gates of a swing bridge at the harbour were inoperative for over half-an-hour.

Haslemere Gas Capital Issue.—Readers will note from our advertising columns that Messrs. A. & W. Richards have received instructions from the Directors of the Haslemere and District Gas Company to offer for sale by tender 1000 £5 6 p.ct. redeemable preference shares—or such number as will, including premiums, realize the net sum of £5000. The minimum price of issue is par; and the shares will be redeemed at this rate on March 31, 1930. The capital now being issued is required for extending mains in the growing districts in the Company's area of supply, and for additions to works and plant rendered necessary by the increasing demand for gas. Tenders must be forwarded to Messrs. A. & W. Richards, at No. 37, Walbrook, E.C., not later than 11 o'clock on Friday, Oct. 19.

CALORIFIC POWER AT A GLANCE.



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STOCK MARKET REPORT.

THROUGHOUT the week the general tone of the markets has been good; but no material expansion of business can be recorded. The report that the Government intend to abandon the policy of deflation which it has pursued for some time, and to substitute a policy of moderate inflation, is receiving a good deal of criticism. From the expansion of the floating debt shown by the weekly return it would appear that this policy is already being put into practice. The object, of course, is to assist trade and so afford relief to the increasing number of unemployed. This policy has been advocated in financial circles for some time; but there appears to be considerable divergence of opinion among manufacturers, some of whom consider that if we once start inflation we must keep on inflating, with ever increasing prices.

The announcement that the second Australian Loan had been considerably over subscribed indicates that there is no lack of British capital, and any factor that can bring about an improvement in the present trade conditions should be taken advantage of.

The bulk of the business was in British and Colonial Government securities, and prices hardened during the week. The presence of the Colonial Premiers in England and the tenor of the speeches at the Imperial Conference have doubtless drawn attention to the latter securities. In the Foreign Market there was a strong demand for Brazilian, Chinese, and Japanese Bonds. Oil and Mining shares were dull. The Oil Market was weak; but higher prices were recorded in Rubber, Tea, and Nitrate shares.

Gas stocks were well supported, and offers were speedily absorbed. Prices are steady and tend to improve. The quotations in respect of the following securities showed variations: Hong Kong ordinary, Liverpool 7 p.ct. preference, and Southampton 4 p.ct. debenture improved, and Continental Union ordinary and Imperial Continental ordinary were marked down slightly.

The following transactions were recorded during the week: On Monday, Bahia-Blanca "A" 48., Commercial 4 p.ct. 95⅞, Compania de Gas de la Habana 5 p.ct. Bonds 99½, 100, European 8⅛, Gas Light and Coke 4 p.ct. 96⅛, 96¼, 96½, 96⅝, 97, 3½ p.ct maximum 66, 66⅝, 4 p.ct. consolidated preference 81½, Imperial Continental 159, Primitiva 5 p.ct. pref. 28s. 6d., 29s., South Metropolitan 98⅛, 99½, Wandsworth "A" 129. Supplementary prices, Uxbridge 5 p.ct. 97½, 98, Wolverhampton 8 p.ct. debenture 105½. On Tuesday, Brentford "A" 4 p.ct. 103½, Commercial 3 p.ct, debenture 60, European 8⅛, Gas Light and Coke 4 p.ct. 96, 96¼, 96⅜, 96⅝, Imperial Continental 158, 158⅛, 159, South Metropolitan 98, 98⅞, 99, Wandsworth "A" 130, (Wimbledon) 111½. On Wednesday, Bournemouth "B" 7 p.ct. maximum 12⅜, 12½, 6 p.ct. preference 10⅞, 11⅛, Cape Town 4½ p.ct. mortgage debenture 1950, 77¼, 78, Cardiff 7½ p.ct. debenture 110⅜, Continental Union 30, Gas Light and Coke 4 p.ct. 96, 96¼, 96⅜, 96⅛, 96⅜, 96⅝, 3 p.ct. debenture 62½, Hastings and St. Leonards 3½ p.ct. 82½, Imperial Continental 157½, 158, Montevideo 49, Primitiva 6s., 5 p.ct. preference 28s., 29s., South Metropolitan 97⅜, 98¼, 98⅞, South Suburban 5 p.ct. 101, 102½, Swansea 7 p.ct. preference 103. Supplementary prices, Barnet "A" 155½, Cheltenham 5 p.ct maximum 71½, 72, Danish 58. On Thursday, Bournemouth 6 p.ct. preference 11⅛, Cape Town 7½, Commercial 4 p.ct. 95⅝, 3½ p.ct. 95½, 96½, European 8 7/16, 8½, Gas Light and Coke 96⅛, 96¼, 96⅜, 96⅝, 3½ p.ct. maximum 66½, 66⅝, 4 p.ct. preference 81½, Hastings and St. Leonards 5 p.ct. 96, 3½ p.ct. 80, 82, Hong Kong 15 7/16, Oriental 101, Primitiva 6s., 6s. 3d., 5 p.ct. preference 28s. 3d., 29s. 3d., 4 p.ct. (Buenos Ayres) debenture 57, South Metropolitan 6½ p.ct. redeemable debenture 105⅜, Tottenham "B" 102⅜, 103⅜, Wandsworth "B" 114⅛. Supplementary prices, Barnet "A" 156⅜, Hong Kong 5 p.ct. mortgage debenture 80⅛, Reading 5 p.ct. maximum 81½, 82, Wandsworth 3½ p.ct. New 102½, 102⅞. On Friday, Brentford "A" 101½, 102, 102½, European 8 7/16, Gas Light and Coke 96, 96⅛, 96¼, 96⅜, Imperial Continental 157, Liverpool 7 p.ct. preference 105½, 106, Montevideo 50, 52, Primitiva 6s., 5 p.ct. preference 28s., South Metropolitan 98¼, 6½ p.ct. debenture 106½, South Suburban 5 p.ct. 101, Wandsworth "B" 112. Supplementary prices, Wandsworth New 103, Wolverhampton 8 p.ct. debenture 105.

The fluctuations in the Foreign Exchanges reflected the hopeful or unfavourable rumours which alternated during the week with regard to the situation in Germany. French francs, which closed the previous week at 77·25, improved on Wednesday to 73·90, but depreciated again towards the end of the week. Italian lire, however, showed little change. In the Money Market ample supplies of credit were available, and loan and discount rates were virtually unaltered.

The Bank of England rate remains at 4 p.ct., to which figure it was raised from 3 p.ct. on July 5.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus	Last Divid. at Rate of	NAME.	Closing Prices, July 30, 1914.	Variation. Present Quotations.	Variation. Lowest and Highest Prices of Transactions.
£			p.c.	% p.a.				
131,978	Stk.	Aug. 9	—	5	Aldershot 5 p.c. max. C.	..	72—77	...
217,992	,,	,,	4	4	Do. 4 p.c. Pref.	..	70—75	...
1,551,868	,,	Oct. 4	2½	5	Alliance & Dublin Ord.	59—64	70—75*	...
374,000	,,	July 12	4	4	Do. 4 p.c. Deb.	76—79	62—67	...
280,000	5	May 17	7½	8	Bombay, Ltd.	5½—6½	5⅜—5⅝	...
100,000	10	Aug. 9	16	8½	Bournemouth Gas and Water { 5 p.c.	..	113—123	...
383,110	10	,,	7	7	Bournemouth Gas and Water { B 7 p.c.	15—15½	113—123	12⅜—12½
115,000	10	,,	6	6	Bournemouth Gas and Water { Pref. 6 p.c.	13½—14	102—113	10⅞—11⅛
162,025	—	June 28	—	4	Bournemouth Gas and Water { 4 p.c. Deb.	..	77—82	...
992,045	Stk.	July 12	14	6 5/10	Brentford A Consolid.	261—266	100—105	101½—103½
734,920	,,	,,	11	6½	Do. B New	204—209	100—105	...
55,000	,,	,,	5	5	Do. 5 p.c. Pref.	109—111	83—88	...
221,400	,,	June 14	4	4	Do. 4 p.c. Deb.	91—93	77—82	...
214,745	,,	Aug. 23	11	11½	Brighton & Hove Orig.	208—213	171—176	...
244,200	,,	,,	8	8½	Do. A Ord. Stk.	154—159	127—132	...
1,287,500	Stk.	July 26	5	5	Bristol 5 p.c. max.	..	95—96 B.	...
570,000	20	Oct. 4	12½	10	British A Ord.	44—45	..*	...
100,000	10	June 28	—	7	Do. 7 p.c. Pref.	..	..	...
120,000	Stk.	,,	4	4	Do. 4 p.c. Deb. Stk.	88—90	75—80	...
100,000	10	May 17	—	7	Cape Town & Dis., Ltd.	1½—2½	6½—7⅛	7⅛
100,000	10	May 3	—	4½	Do. 4½ p.c. Pref.	4—6	6—7	...
150,000	Stk.	June 28	4½	4½	Do. 4½ p.c. Deb. Stk.	70—75	75—80	77½—78
237,860	,,	,,	—	7½	Cardiff 7½ p.c. Deb.	..	106—111	110½
157,150	,,	Feb. 26	5	5	Chester 5 p.c. Ord.	108—110	..	..
2,513,280	,,	July 26	5/9/4	6	Commercial 4 p.c. Stk.	106—108	95—98	95⅞
560,000	,,	,,	5⅛	6	Do. 3½ p.c. do.	103—105	93—95	95⅛—96½
475,000	,,	June 14	3	3	Do. 3 p.c. Deb. Stk.	69½—72½	60—64	60
800,000	,,	14 Jan. 15	4	—	Continental Union, Ltd.	76—79	30—35	30
200,000	,,	Dec. 14	7	4	Do. 7 p.c. Pref.	115—118	72—77	...
660,000		Aug. 9	—	6½	Croydon sliding scale.	..	101—104	...
284,975		,,	—	5	Do. max. div.	..	81—85	...
492,270	Stk.	—	6	4½	Derby Con. Stk.	123—125	..	...
55,000	,,	—	4	4	Do. Deb. Stk.	102—104	..	...
209,000	,,	Oct. 4	—	5	East Hull 5 p.c. max.	..	..*	...
1,002,180	10	July 12	10	5	European, Ltd.	17½—18	8—9	8⅛—8½
16,546,120	Stk.	July 26	4/17/4	5⅛	Gas { 4 p.c. Ord	98—102	95½—97½	96—97
2,600,000	,,	,,	3½	3½	Gas { 3½ p.c. max.	76—79	65—68	66—66⅝
4,062,235	,,	,,	4	4	Light { 4 p.c. Con. Pref.	96—99	80—83	81⅛—81⅜
4,761,930	,,	June 14	3	3	and { 3 p.c. Con. Deb.	72½—74½	61—64	62½
130,000	,,	Dec. 11	10	10	Coke { 10 p.c. Bonds	..	..	...
42,000	—	—	—	7½	Coke { 7½ p.c. Ilford Deb.	..	..	...
82,500	,,	Sept. 19	5	6⅔	Hastings & St. L. 5 p.c.	..	93—98	95
258,740	,,	,,	3½	5⅛	Do. 3½ p.c.	87—89	78—83	80—82½
70,000	10	May 17	11	10	Hongkong & China, Ltd.	16½—16⅝	15⅛—15⅞	15 7/8
86,600	Stk.	Aug. 23	9	9½	Hornsey 7 p.c.	..	144—149	...
1,976,000	,,	May 31	9	17	Imperial Continental	150—160	157—162	157—159
401,400	,,	Aug. 9	3½	3½	Do. 3½ p.c. Deb. Red.	84—86	76—78	...
235,242	,,	,,	6½	6½	Lea Bridge Ord. 5 p.c.	119—121	95—100	...
4,127,240	,,	Feb. 26	10	5½	Liverpool 5 p.c. Ord.	..	..	...
600,000	,,	Sept. 19	—	7	,, 7 p.c. Pref.	..	104—107	105½—106
165,736	,,	Aug. 23	7/5/6	9	Maidstone 5 p.c.	..	104—109	...
63,480	,,	June 28	—	—	Do. 3 p.c. Deb	..	52—57	...
75,000	5	June 14	6	7	Malta & Mediterranean Met. of Melbourne { 4½ p.c. Deb.	4⅛—4½	3⅞—4	...
50,000	100	Oct. 1	4½	4½	Montevideo, Ltd.	99—101	95—98*	...
541,920	Stk.	May 17	4	4	Newcastle & Gatsh'd Con.	11½—12	49—54	49—52
1,875,892	,,	July 26	4½	4½	Do. 4 p.c. Pref. Stk.	98½—99½	83½—84½ N.	...
250,166	,,	Aug. 9	—	4	Do. 3½ p.c. Deb.	..	74½—76½ N.	...
329,705	,,	June 28	3½	3½	North Middlesex 10 p.c.	82—83	71—73 N.	...
15,000	10	Aug. 23	—	11	,, 7 p.c.	..	16½—17½	...
75,940	10	,,	7/14/0	7 1/10	Oriental, Ltd.	14—15	11⅜—12⅜	...
300,000	Stk.	May 3	8	7	Plym'th & Stonh'se 5 p.c.	117—122	97—102	101
138,120	Stk.	June 28	—	7½	Portsea Island, B	..	108—113	...
60,000	50	Sept. 6	13	13	Do. C	128—131	100—105	...
100,000	50	,,	12	12	Primitiva Ord.	118—121	97—102	...
1,450,345	5	29 Oct. 14	8	—	Do. 5 p.c. Pref.	5½—6	⅞—1	6/—6/3
2,499,800	5	30 Dec. 15	5	—	Do. 4 p.c. Deb.	4⅛—5	1⅛—1½	28/—29/3
341,400	100	June 1	4	4	Do. ,, ,, 1911	91—93	70—74	...
600,000	Stk.	July 26	4	4	Do. B. Aires 4 p.c. Deb.	..	56—59	...
220,935	,,	June 28	4	4	Do. Riv. Pl. 4 p.c. Deb.	85—87	56—59	57
321,670	,,	,,	4	4	San Paulo { 6 p.c. Pref.	85—87	56—59	...
150,000	10	Oct. 4	6	6	San Paulo { 5 p.c. Deb.	10½—11	5¼—6*	...
125,000	50	July 2	5	5	Sheffield A	47—49	38—41	...
270,000	Stk.	Aug. 23	10	5	Do. B	223—224	102—104 S.	...
419,968	,,	,,	10	5	Do. C	222—224	101—103 S.	...
1,047,000	,,	,,	10	5	Shrewsbury 5 p.c.	220—229	99—101 S.	...
133,201	Stk.	—	4	6	South African	..	..	...
90,000	10	May 31	9	9	South Met. Ord.	10½—11½	7½—9½	...
6,609,895	Stk.	July 26	5/9/4	5	Do. Red. Pref.	111—113	97½—99½	97⅞—99½
250,000	,,	July 12	—	5	Do. 3 p.c. Deb.	..	93—100	...
1,895,445	,,	,,	3	3	Do. 6½ p.c. Deb.	72⅛—74⅛	61—64	...
734,000	,,	Sept. 6	—	6½	South Shields Con. Stk.	..	105—107	105⅞—106⅛
91,500	,,	Aug. 23	8½	8½	S'th Suburb'n Ord. 5 p.c.	157—159	127—129 N.	...
1,087,795	,,	,,	6	6	Do. 5 p.c. Deb. Stk.	114—116	100—103	101—102½
368,837	,,	June 28	5	5	S'th'mpt'n Ord. 5 p.c. max	116—118	95—100	...
647,740	,,	May 3	5	7	Do. 4 p.c. Deb. Stk.	99—102	88—91	...
121,275	,,	June 28	4	4	Swansea 7 p.c. Pref. Stk.	..	75—80	...
250,000	,,	Aug. 23	—	7	Do. 6½ p.c. Deb. Stk.	..	102—104	103
200,000	,,	June 28	—	6½	Tottenham { A 5 p.c.	..	105—107	...
120,000	,,	July 26	—	8	Tottenham { B 3½ p.c.	135—138	122—127	...
782,275	,,	,,	6	6½	Tottenham { 4 p.c. Deb.	115—117	100—105	102½—103½
181,255	,,	June 14	4	4	Tynemouth 5 p.c. max.	87—89	78—82	...
258,251	Stk.	Aug. 23	5	5	Wandsworth, Wimbledon, and Epsom—	108½—109	88—90 N.	...
30,000	,,	July 12	8½	9	Wandsworth A 5 p.c.	151—156	126—131	129—130
255,636	,,	,,	6½	7½	Do. B 3½ p.c.	129—134	112—117	112—114½
108,075	,,	,,	5/17/3	6 5/8	Do. C.	110—115	98—103	...
140,865	,,	,,	—	6 5/8	New Ordinary	..	..	102½—103
352,000	,,	,,	6½	7½	Wimbledon 5 p.c.	117—122	109—114	111½
98,000	,,	,,	6½	7½	Epsom 5 p.c.	121—126	112—117	...
88,426	,,	June 28	3	3	5 p.c Deb. Stk.	66—69	57—60	...

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THE FLOW OF GASES and PROPORTIONING GAS MAINS.

By

F. SOUTHWELL CRIPPS, Assoc.M.Inst.C.E.

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XUM

The Ministry of Health has sanctioned the loan of £10,000 asked for by the Poulton Council, for extensions at the gas-works.

The cost of Blackpool's recent carnival is to be met by taking £4000 from the gas-works profits, and the balance of £1500 from the market's undertaking.

At a meeting of the Withnell District Council on Oct. 11, the price of gas was reduced from 5s. 6d. to 5s. per 1000 c.ft., with a 10 p.ct. discount on slot meters.

The Medical Officer of Blackburn (Dr. Allen Daley) recently stated that when all houses were fitted with gas cookers and fires, instead of coal-ranges, Blackburn would be an ideal town from a health point of view.

The new sessional programme of the Irish Free State Parliament mentions the intended introduction of a Bill for the establishment of a Patents Office, the protection of inventions, and the registration of trade marks and designs.

At a recent meeting of the Stockton-on-Tees Town Council, it was resolved than an application be made to Quarter Sessions for the appointment of a gas examiner, and that the Town Clerk should issue an advertisement for applications for the position.

At a meeting recently of the Darlington Town Council, Councillor Leng, in moving the adoption of the Gas Committee's minutes, said that during the next few months they might ask the Council to extend the gas-works. The output was improving, and the plant had become too small for the needs of the town.

At a meeting of the Teignmouth Urban District Council, a letter was read from the local Harbour Commissioners, stating that they offered no objection to the Council's scheme in connection with the proposed gas supply to Shaldon, and the laying of a submarine gas-main across the river, subject to an agreement protecting the Commissioners' rights.

The Burton-on-Trent Corporation Gas Engineer (Mr. W. Wilson) has made a report with reference to giving a supply of gas to Alrewas, and the Committee have resolved that application be made to the Board of Trade for a Special Order under section 10 of the Gas Regulation Act, authorizing the Corporation to supply gas to Alrewas and any places or premises situate between Barton-under-Needwood and Alrewas.

The Birmingham Corporation have approved unemployment relief works for the ensuing winter, the cost of which is estimated at £1,400,000. The schemes include the provision of a coke-breeze washer at a cost of £2000, and gas service to several parks and recreation grounds £1500.

The Accrington District Gas Board have given notice of their intention to apply to the Board of Trade for a Special Order empowering them, among various things, to acquire the Whalley Gas Light Company. The Clitheroe Rural Council have decided not to offer any objection to the application.

At the Industrial Trades Exhibition, opened in the Drill Hall, Derby, last Friday week, the Gas Company had a capital display showing the advantages of gas. Modern methods *versus* the old methods were illustrated under the able direction of Mr. H. Clark, the Distribution Superintendent.

The Directors of the South African Lighting Association, Ltd., have resolved to pay on the 31st inst., to shareholders registered in the books of the Association on the 26th ult., an interim dividend of 3 p.ct. (6 p.ct. per annum), less income-tax at 3s. 9d. in the pound. This compares with 3½ p.ct. (7 p.ct. per annum) paid a year ago.

Through the generosity of Councillor S. Morris, Chairman of the Doncaster Corporation Gas Committee, and Mrs. Morris, the gas department workers were entertained to a social evening and supper at the Mansion House recently, the company including the Mayor and Mayoress of Doncaster, and Alderman and Mrs. Kay. The gathering of 160 persons spent a most enjoyable evening.

The Walsall Town Council last week decided to erect a breeze washing and screening plant at the gas-works, at a cost of £2650. The Mayor (Alderman G. W. Warner), who visited the Coventry Gas-Works to inspect a similar plant, asserted that the Coventry Gas Department sent breeze to the Walsall district, while the local undertaking had been unable to develop the trade owing to lack of machinery.

A verdict that death was due to heart failure, accelerated by carbon monoxide poisoning, was returned at a Holmfirth inquest on Joshua Marsden, wheelwright and joiner, who was said to have enjoyed good health at 75 years of age, but to have been affected, apparently, by fumes from a gas-engine in his workshop. His son said that, so far as they were aware, the engine and exhaust were quite in order.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON TUESDAY, to ensure insertion in the following day's issue.

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E. B. SHARPLEY,
Town Clerk.

Town Hall,
Stoke-on-Trent,
Oct. 10, 1923.

CHELTENHAM GAS LIGHT AND COKE COMPANY.

SUPERINTENDENT.

APPLICANTS for the above Vacancy are THANKED, and informed that THE POSITION HAS BEEN FILLED.

J. PATERSON,
Engineer and General Manager.

Oct. 11, 1923.

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MILFORD HAVEN URBAN DISTRICT COUNCIL.
(GAS AND WATER DEPARTMENTS.)

THE above named Council are pre- pared to receive TENDERS for the RE-SETTING of a Bed of Six RETORTS at their Gas-Works at Milford Haven.
Specification and a copy of the Conditions may be obtained on application to the undersigned.
Tenders, endorsed "Retort Contract" and addressed to the "Chairman of the Gas Committee," must be Delivered to the undersigned not later than Wednesday, Oct. 31, 1923.

THOS. G. WILLIAMS,
Clerk to the Council.

Council Offices,
Charles Street,
Milford Haven,
Oct. 15, 1923.

COMPANY NOTICE.

IMPERIAL CONTINENTAL GAS ASSOCIATION
(INCORPORATED BY ACT OF PARLIAMENT.)

NOTICE is Hereby Given that the CAPITAL STOCK TRANSFER BOOKS WILL BE CLOSED from the 24th of October to the 6th of November, both days inclusive, for the payment, on the 15th of November, of an Interim Dividend of Five per Cent. (actual) for the Half-Year ended 30th June, 1923, less Income-Tax at 4s. 7½d. in the pound (the average rate for the year).

By order of the Board,
F. H. JAMES,
Secretary.

6, London Wall,
London, E.C. 2,
Oct. 13, 1923.

STOCK AND SHARE ISSUES.

By Order of the Directors.
NEW ISSUE OF CAPITAL.

HASLEMERE AND DISTRICT GAS COMPANY.

MESSRS. A. & W. RICHARDS
Are instructed to offer for SALE, by TENDER,
1000 £5
SIX PER CENT. REDEEMABLE PREFERENCE SHARES
(or such number as will, including premiums, realize the net sum of £5000).
MINIMUM PRICE OF ISSUE, PAR.
To be redeemed at Par on the 31st March, 1930.

Prospectus and Form of Tender (which latter must be sent in by 11 o'clock on Friday, October 19, may be obtained of Messrs. A. & W. RICHARDS, 37, WALBROOK, E.C. 4.

By Order of the Directors.
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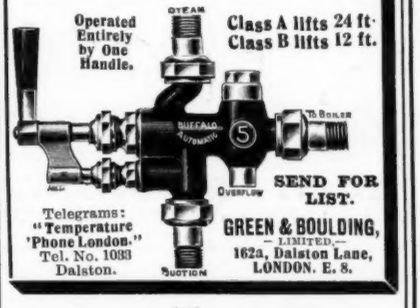

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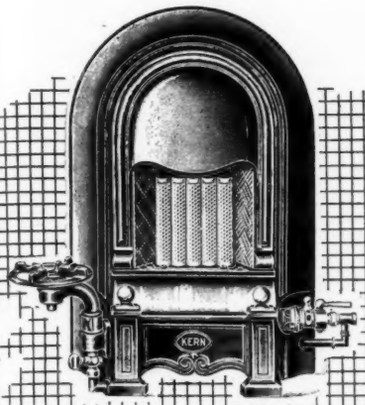

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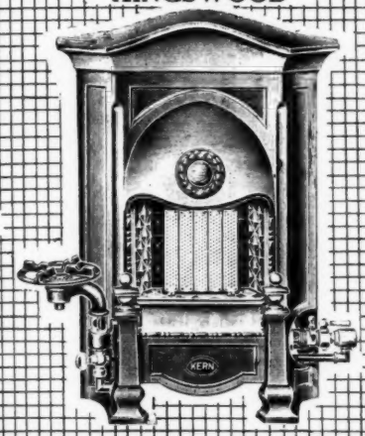

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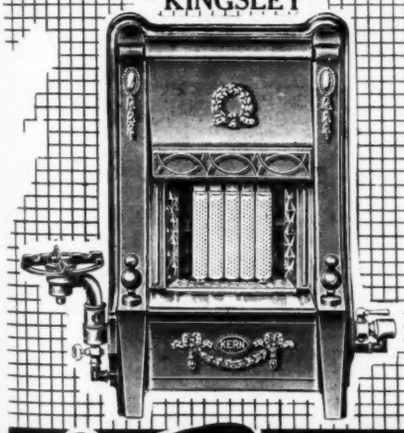

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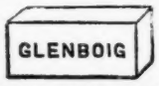
TRADE 

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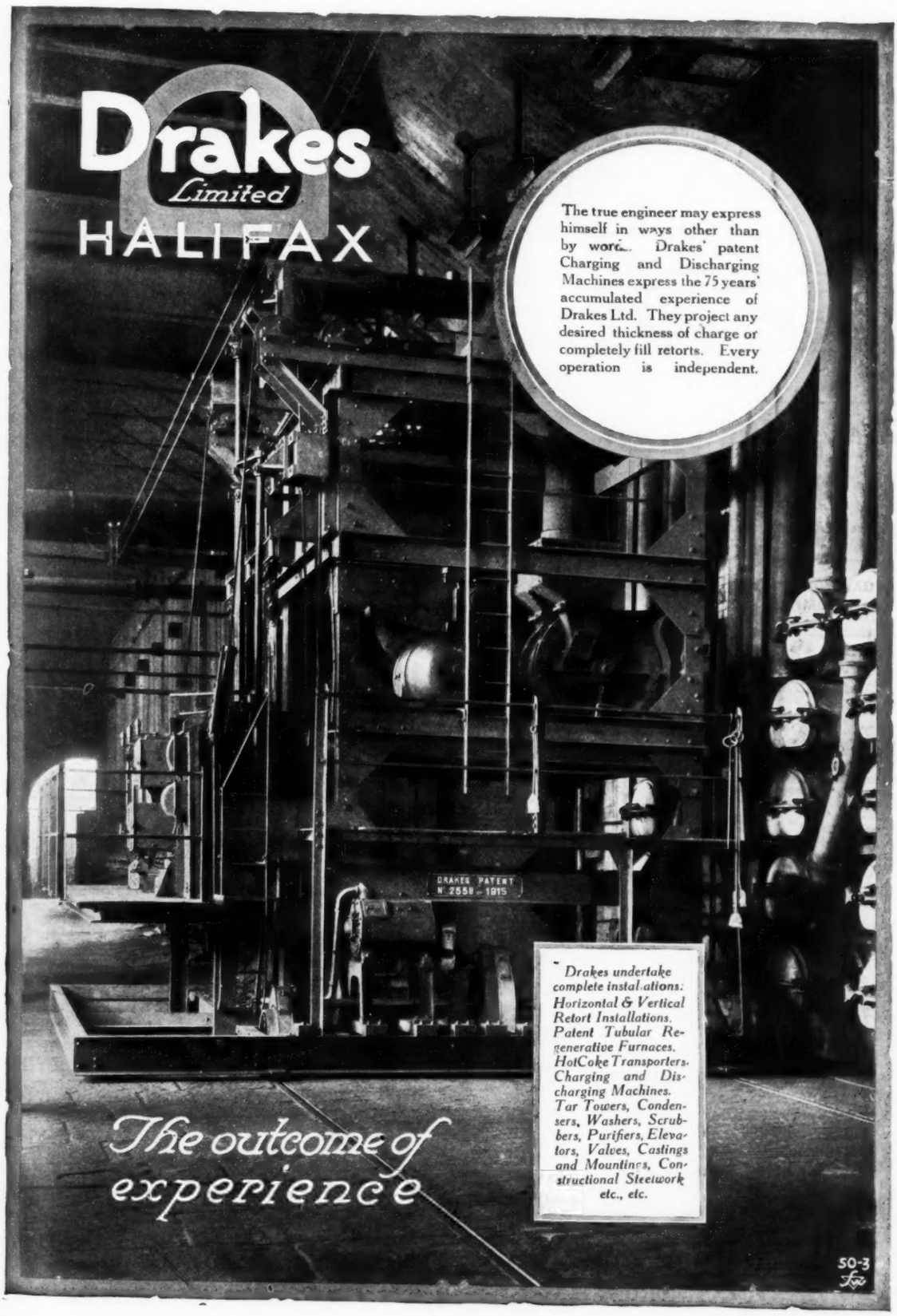
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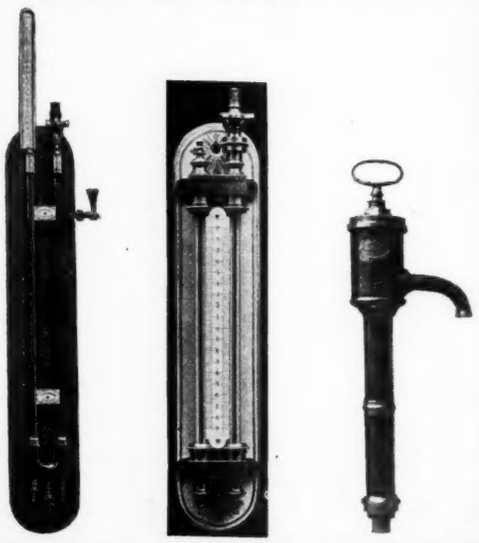

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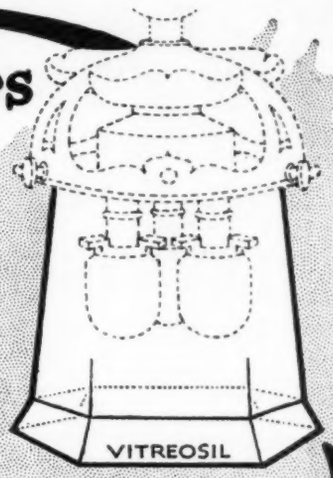

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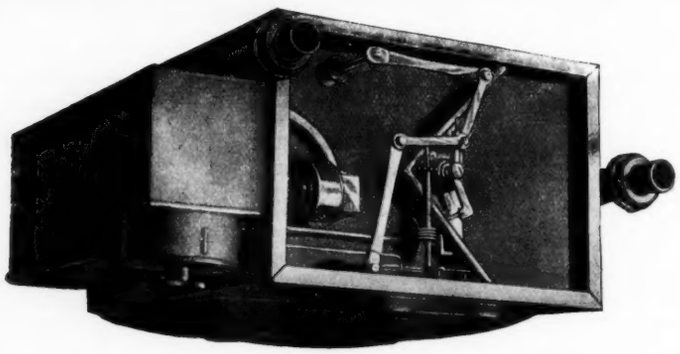

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Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

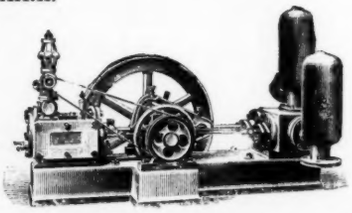
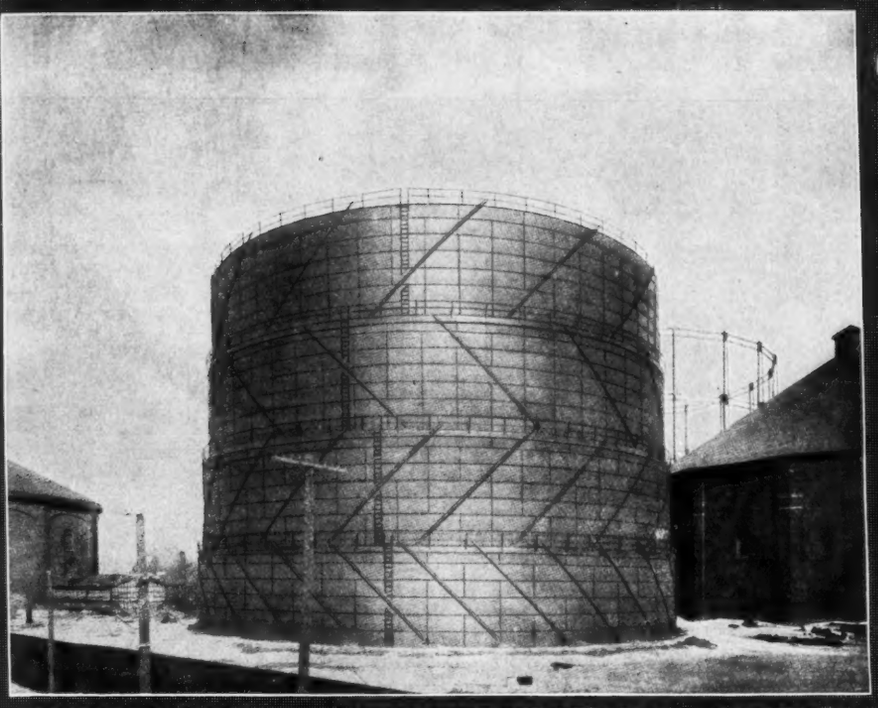


Fig. 685. "RELIABLE" STEAM PUMP FOR TAR AND THICK FLUIDS.

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.



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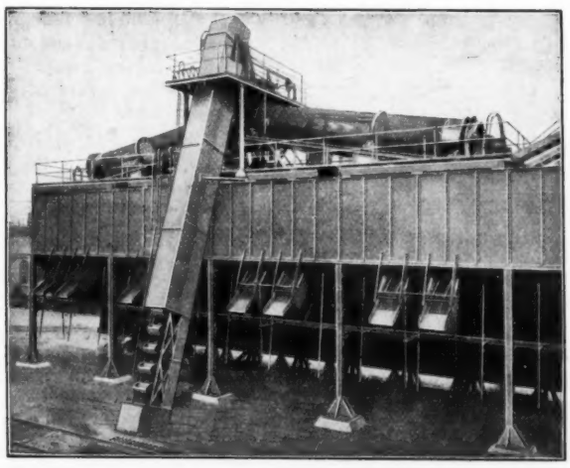

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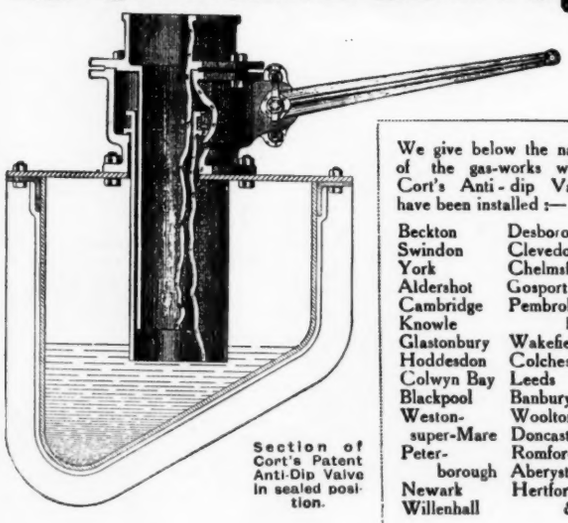

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